Additional Comments and Responses

Comment

The current economic climate is such that investment in air pollution control systems is not possible for some companies. The AQMD should re-visit control measures in the draft AQMP that will have an adverse economic impact (e.g. the proposal to require facilities to pay $5,000 per ton of VOC emitted above 10 tons per year).

Response

The short-term (defined) control measures included in the draft 2003 AQMP identify potential control options an emission source can implement to achieve emission reductions. The overall control efficiency for a control measure will ultimately take into account feasible controls for various subcategories subject to the control measure, and this type of analysis is typically conducted during rulemaking. Therefore, potential control options described in the control measures will be subject to further technology/cost/feasibility assessment conducted during the rulemaking process.

The socioeconomic analysis of the 2003 AQMP presents the cost of the draft Plan and its CEQA alternatives. The analysis of the AQMP provides aggregated economic impacts related to various industries. For example, the analysis includes the average annual control costs for quantifiable control measures among various industries, the impact on product prices of regional industries (relative to the rest of the U.S.), and job impacts by industry. A more detailed impact analysis would be conducted for any proposed rule developed from a control measure. Rule development would necessitate thorough analyses of emission reduction potential, cost-effectiveness and potential socioeconomic impacts, as well as any potential adverse environmental impacts. Such analyses would be performed with input from all stakeholders and be presented to the AQMD Governing Board prior to their consideration of a proposed rule.

Finally, regarding a $5,000 per ton charge to large VOC sources, this measure is included in the proposed 2003 AQMP pursuant to the federal Clean Air Act §185 which requires implementation of such a measure in the event the Basin does not reach attainment by 2010 . It should be noted that the control measure has been revised to apply only to VOC emissions in excess of 80% of baseline emissions during the attainment year (i.e., 2010).

Comment

Given the significant contributions to emission reductions already made by stationary sources, it is time for the state and federal agencies to be responsible for

their fair share of emission reductions. The emissions inventory indicates that a focus on mobile sources would significantly reduce emissions and more equitably spread the burden of compliance.

Response

The AQMP is a comprehensive planning document that includes measures proposed by the District, CARB, and SCAG, and must be approved by CARB's Governing Board prior to being forwarded to U.S. EPA for approval and inclusion in the State Implementation Plan (SIP). The 2003 AQMP includes two scenarios for distributing the long-term reductions by responsible agencies. Under Scenario 1, recommended by District staff, emission reduction commitments are established based on the agencies 1997/99 commitment and the extent of their contributions to the remaining emissions. Under this scenario, the District commits to achieving an additional 31 tons per day of VOC (even though the District has already exceeded its 1997/99 target) and the remainder of the emission reductions are assigned to CARB and U.S. EPA (i.e., 234 tons per day VOC and 181 tons per day NOx). In contrast, CARB prefers an alternative control strategy scenario (i.e., Scenario 2) which proposes a single black box for the grand total of the required long-term reductions with the agency assignments to be determined in the future. Considering the magnitude of additional emission reductions needed for attainment and the overwhelming contribution of non-stationary sources to the emissions inventories, the unwillingness by the state and U.S. EPA to ensure additional long-term and especially short-term emission reductions, is rather disappointing.

U.S. EPA has asserted that the District and the state cannot commit reduction obligations to the federal government. Consequently, the 2003 AQMP also includes two attainment demonstration options relative to emissions associated with federal sources. Option 1 would rely on the federal government to achieve 68 tons per day of NOx reductions whereas Option 2 excludes any reductions from federal sources. Option 2 would therefore add to the emission burden facing the District when devising an attainment strategy for the PM2.5 and 8-hour ozone standards. Therefore, District staff believes that the federal government should commit to its fair share of reductions toward the attainment goals.

Comment

If emission reductions are not apportioned and assigned directly to responsible agencies today, the District (and local stationary sources) in the future will unfairly be expected to achieve a disproportionate level of emission reductions.

Response

Staff concurs with this comment. As stated in the previous response, District staff has developed a proposed control strategy that sets reduction commitments by agency for long-term reductions based on the extent of agency contribution to emissions. However, CARB prefers an alternative control strategy scenario which proposes a single black box for the grand total of the required long-term reductions.

Comment

The AQMP should be amended to reflect advances in technology.

Response

Chapter 4 of the 2003 AQMP already includes discussion on the status of various advanced alternatives and has also been modified to include additional information in the subsections entitled "Advanced Technologies – Renewable Power Generation Technologies," "Advanced Low VOC Technologies," and "Innovative Control Approaches."

Comment

No information has been provided estimating the level of fees, or range of fees, that would be imposed on federal sources by Control Measures FSS-05 and FSS-07. These fees should be applied nationwide in order to avoid economic inequities with other regions. In addition, the collected fees should be spent in the communities where the emissions occur so that the local communities could benefit.

Response

The actual specific design on how a mitigation fee for federal sources or an emission fee program for port-related sources would be structured has not fully been developed. The details of such a program would be thoroughly evaluated and analyzed during the program development of the control measure. However, the measure has been revised to include general criteria for establishing fees and selecting projects.

The emission fees collected as a result of establishing mitigation fee programs for federal and port-related sources will be used to fund emission reduction projects throughout the basin, although port and airport-related projects will be given high priority. Environmental justice issues will be one of the criteria considered in

selecting projects. The District will seek to fund projects that offer the greatest emission reduction potential and benefit to the impacted community.

Comment

A revenue-neutral emissions based landing fee at airports may provide a good compromise to the concept of mandating accelerated replacement of existing higher emitting engines with lower emitting ones. We recommend that U.S. EPA implement this concept nationwide.

Response

Control Measure FSS-05 would establish a mitigation fee for federal sources, including aircraft. The fee would either be imposed directly on federal sources or would be obtained through a grant from U.S. EPA, or by U.S. EPA imposing fees and collecting monies for emissions in and around the airports. The District has the authority to impose indirect source regulations and fees on such sources of emissions, as well as the authority to impose restrictions on nonroad sources and to establish fleet rules. We believe this authority would allow the District to impose fees to support the regulation of these sources, as well as to substitute for direct regulation of these sources. At this point the control measure does not have the details of a rule, and much of the structure will be determined during the rulemaking procedure. Language has been added to the control measure that establishes the design criteria that will be used in establishing the fee and in selecting the emission reduction projects that will funded with the mitigation fee. The program design and implementation details, including whether to establish a revenue-neutral emission based landing fee, will be developed during the program development stage, where a thorough and collaborative effort will be initiated involving the District staff, regulated entities, and other interested stakeholders. Of course, U.S. EPA can expand the fee concept and adopt it nationally, taking into consideration the air quality need.

Comment

It is recommended that since international emission standards would continue to be adopted by the International Civil Aviation Organization (ICAO), the mitigation fee program for aircraft under Control Measure FSS-05 be eliminated as conversion of aircraft engines to lower emitting engines takes place. In addition, it is not clear how each source would be treated or how the measure would be implemented.

Response

As mentioned earlier, Control Measure FSS-05 would establish a mitigation fee for federal sources, including aircraft. The program would be developed as an alternative to national rules with the goal of achieving a fair-share reduction from federal sources to address unique local needs. The exact details on how the fee would be structured would be thoroughly evaluated during program development. Current and future emission standards such as those adopted by the ICAO would be evaluated as part of this rule development effort. The District staff considers it premature to propose elimination of FSS-05 if ICAO standards are adopted since the analysis of these standards wouldn't take place until the program development of the control measure begins. The purpose of emission fee programs is to achieve reductions. If reductions can be achieved in a fair and equitable manner, fees can be substituted.

Comment

Jurisdictional issues, such as statutory authority and overlap and duplication of CARB and AQMD regulations, need to be resolved. Specifically, there is apparent overlap between FSS-05 with AIRPORT-1 and FSS-07 and FSS-06 with Marine-4. Likewise, there appears to be overlap of CTS-07 and CTS-10 with existing District source specific regulations.

Response

The draft 2003 AQMP is designed as a comprehensive strategy to reduce emissions from all applicable emission sources. As a planning document, the 2003 AQMP purposely proposes multiple control mechanisms to cover the applicable sources regardless of which agency has regulatory authority. District, CARB, and U.S. EPA staff will ensure that the rules developed from the control strategy set forth in the 2003 AQMP will not be substantively or jurisdictionally duplicative such that the sources are not inappropriately subject to multiple requirements from different rules.

Control Measure AIRPORT-1 is a CARB proposed control measure. CARB has removed AIRPORT-1 from its proposed short-term control strategies and it is now being proposed as a long-term control concept for U.S. EPA's future consideration.

Control measure FSS-07 includes port-related mobile sources such as ships, trains, trucks, and off-road equipment. Control Measure FSS-06 includes various categories of off-road vehicles and equipment such as construction/industrial equipment, utility engines, lawn and garden equipment, off-road recreational

vehicles, recreational marine and other non-highway mobile equipment. MARINE-4 (renumbered to MARINE-2) is a CARB measure and is designed to reduce the emissions from port-side sources such as off-road equipment. Although, there is overlap between the types of off-road equipment subject to control measures FSS-06, FSS-07, and MARINE-4, during rule development, these overlaps will be taken into account to ensure that the same categories are not subject to multiple requirements. In order to address these potential overlaps, the control measures have been revised to indicate that staff will conduct further analysis during rule implementation to identify the most feasible control strategy for each source category (e.g., reduction controls, mitigation fee).

Control measures proposed in the 2003 AQMP and in previous AQMPs seek further emission reductions from regulated sources. Likewise, the District routinely reevaluates existing rules to determine if additional feasible reductions may be achieved from regulated sources. Relative to the 2003 AQMP, control measures CTS-07 and CTS-10 seek additional reductions from sources already regulated by District rules. As discussed in these control measures, assessments of applicable coating and solvent categories will be conducted to determine where additional emission reductions may be feasible. Further regulation of such sources is not considered regulatory overlap or duplicative regulation.

Comment

The enabling authority for FSS-05 should be clarified.

Response

Control Measure FSS-05 would establish a mitigation fee for federal sources in order to achieve a fair share reduction commitment by federal sources. This measure is designed for the U.S. EPA to implement in lieu if national standards, if so chosen by the agency. The fee would either be imposed directly on federal sources or would be obtained through a grant from U.S. EPA, or by U.S. EPA imposing fees and collecting monies for emissions on federal sources. The U.S. EPA has authority to regulate federal sources (e.g., setting standards, imposing fees). The District's role would be to administer the emission reduction projects funded by the fees collected or by U.S. EPA grant monies.

Comment

The emission reductions from previous SIPs and on-going measures and port programs are not being properly credited towards the reduction goals of the AQMP.

Response

The projected inventories in the 2003 AQMP reflect the adopted regulations by District, CARB, and U.S. EPA as well as the most recent growth forecasts from SCAG's 2001 Regional Transportation Plan. Past efforts and improvements which may have air quality benefit are primarily implemented for operational reasons and need to be further evaluated before SIP emission reduction benefits can be claimed. In designing future regulatory approaches to reduce emissions from ports, including establishing emission baselines and reduction targets, early and voluntary reductions would be taken into account to ensure fair and equitable treatments of all regulated entities in this source category. During rule development, District staff will consider voluntary measures implemented by port terminal operators. In order for these reductions to be credited toward SIP commitments, they have to be federally enforceable through an approved SIP.

Comment

The AQMP lacks sufficient details about several proposed strategies and requirements for local governments and business. The AQMP should clearly describe the local government commitments and responsibilities.

Response

The control measures in the AQMP contain sufficient detail in terms of control concepts/methods, implementation agency, and others. Specific implementation issues (e.g., cost impacts on affected source categories, and control technologies) will be thoroughly evaluated during the rule development phase of each measure. Control measures which require local governments to implement a portion of the control measures such as Control Measure MSC-01 (which is a voluntary measure) are identified as such in the Implementing Agency Section of each control measure.

Comment

Private fleets should be regulated by all current and proposed fleet rules imposed on public fleets.

Response

The innovative fleet rules were adopted in 2000 and 2001 after comprehensive rule development efforts. The District is in the process of gaining important knowledge regarding the design and operation of the fleet program through implementation of the rules. Potential expansion of the fleet rule program,

including the regulation of private fleets, will be considered based on the experienced gained through the program that is already in place. This concept has been included in the 2003 AQMP for further evaluation for achieving long-term reductions.

Comment

Extensive outreach with affected communities and stakeholders, including local governments, is necessary before specific rules are promulgated.

Response

Legal requirements and District policy ensures that comprehensive stakeholder involvement is an integral part of the rule development process. The public process includes public notification and release of the proposed rule, staff report, and other supporting documentation, public consultation meetings and workshops, working group meetings, and the availability of staff for individual meetings prior to the proposal being brought before the Governing Board at a public hearing.

Comment

The 2003 AQMP needs to specifically identify the lowest cost control strategy that still provides for expeditious attainment of the standards.

Response

The California Clean Air Act requires the District Governing Board to determine that the AQMP is a cost-effective strategy that will achieve attainment of the state standards by the earliest practicable date [Health and Safety Code §40913(b)]. In addition, the AQMP must include an assessment of the cost-effectiveness of available and proposed measures and a list of the measures ranked from the least cost-effective to the most cost-effective [Health and Safety Code §40922]. Tables 6-11 and 6-12 provide a listing of the control measures that have available cost information for stationary and mobile source measures, respectively. The proposed implementation schedule for these measures is provided in Chapter 7.

Comment

The District should consider whether a little additional control directed to primary PM10 emissions in the eastern part of the Basin would achieve PM10 attainment without any additional NOx controls.

Response

The District is seeking additional control of primary PM10 emissions in the eastern part of the Basin through the inclusion of Control Measure BCM-08 which considers localized controls as part of the proposed method of control. In addition, the difference between the 2006 (PM10 attainment year) controlled and baseline emissions inventories for NOx are minor which indicates that the District is not relying on excess NOx controls to demonstrate compliance with the 2006 PM10 standard. Further NOx reductions are primarily designed for obtaining the 1-hour ozone standard and making progress toward the PM2.5 standards.

Comment

The AQMP should focus on identifying the optimal VOC/NOx emissions control strategy that achieves the federal 1-hour ozone standard.

Response

NOx and VOC are the primary building blocks of ozone. Reductions of NOx will reduce ozone contingent upon the ambient VOC/NOx ratio. The two options contained in the Plan (i.e., with federal control and without federal control) illustrate the optimal VOC/NOx strategy. Under Option 2, when the NOx carrying capacity is raised by 68 tpd, the peak 1-hour ozone level is predicted to be 12.4 pphm, while Option 1 (with 530 tpd of NOx), the peak ozone is predicted to be 12.3 pphm.

Comment

We are concerned with the size of the black box and the lack of identifiable control strategies to reduce its size.

Response

Clean Air Act §182(e)(5) allows an extreme non-attainment area such as the District to rely on the future development of new control technologies or the improvement of existing technologies. There are no limitations placed on the amount of reductions that may be obtained by future control measures. All responsible agencies need to work diligently to identify control measures to replace the black box measures and welcome your suggestions on feasible measures that could be identified to reduce the size of the black box.

A discussion on the process to identify future new strategies has been added to Control Measure LTM-ALL in Appendix IV-A in order to achieve the District's

long-term reduction commitment. This process will consist of several mechanisms which are likely to include the development of an annual technology assessment workshop process which would act as a means to bring together ideas that would identify the latest technology improvements and process changes resulting in feasible control strategies. A Subcommittee of the AQMP Advisory Group has also been established since April 2003 to identify additional control strategies on an on-going basis in order to reduce the size of the black box. A preliminary list of suggestions provided by the Subcommittee has been included in the Plan, subject to further evaluation. In addition, studies conducted as part of implementing the Annual Emissions Reporting Program could be used to identify new emission reduction strategies. Periodic BACT updates can also be used to identify new emission reduction strategies that may result from add-on controls or process changes. Future evaluations on VOC reactivity of various compounds may also provide a basis for establishing control strategies that substitute highly-reactive VOCs with low reactive VOCs. New control measures identified through any of the mechanisms will be reported to the Governing Board in December of every year, as part of the District's Annual Rule and Control Measure Forecast Report. This report will also provide a preliminary estimate of the expected emission reductions from each newly identified measure along with the proposed rule adoption calendar. Furthermore, in January of each year, District staff will provide a summary of the emission reductions achieved through adoption of the control measures by the Governing Board in the previous year(s) to track the performance of its SIP commitment. CARB has committed to a public process to identify black measures in the next several years. It is imperative that all agencies work diligently to identify, adopt, and implement additional measures as expeditiously as possible.

Comment

Control Measures MSC-08, CMB-10, and FSS-04 would limit future economic growth in the Los Angeles region.

Response

The impacts on future economic growth from the draft 2003 AQMP have been analyzed and are discussed in the Draft Socioeconomic Report for the 2003 AQMP. The total average annual cost and benefits of the 2003 AQMP in 2010 is estimated to be $3.2 billion and $6.6 billion, respectively. Furthermore, the impacts on future economic growth from the implementation of Control Measures MSC-08 (Further Emission Reductions from Large VOC sources), CMB-10 (Additional Reductions for NOx RECLAIM), and FSS-04 (Emission Charges of $5,000 per Ton of VOC for Stationary Sources over 10 Tons per Year) will be

more thoroughly evaluated during the rule development of each control measure so as to minimize any adverse impacts.

Comment

Control Measure CMB-10 would reduce the NOx allocations at the LADWP in-basin generating facilities. In addition, this measure could lead to a shortage of NOx credits.

Response

The aim of proposed control measure CMB-10 is to achieve additional feasible reductions from the RECLAIM universe. It is not intended to be so stringent as to result in an actual shortage of credits. The extent of the reduction impacts from the implementation of Control Measure CMB-10 will be further evaluated during rule development of the control measure.

Comment

Control Measures MSC-03, CTY-01, CTS-07, and CTS-10 would result in increased costs to the City's construction activities due to the proposed requirements for new technologies, material, accelerated implementation schedules, and new equipment purchases. The AQMP should carefully consider these increased costs in light of the expected emission reductions and work with local government on achieving the most cost-effective measures.

Response

The socioeconomic impacts of the draft 2003 AQMP have been comprehensively analyzed and are discussed in the Draft Socioeconomic Report for the 2003 AQMP. Control measure MSC-03 is a voluntary measure and would not impose requirements on local government. District staff is committed to work closely with local government and all stakeholders in developing these control measures into regulations. The impacts from the implementation of the control measures will be further evaluated during rule development of each control measure.

Comment

Control Measure FSS-06 briefly discusses particulate traps as a possible control method for emissions from off-road vehicles. Due to the wide range of age and engine types in off-road vehicles, it may be difficult to produce a verified trap that would work on the majority of these vehicles.

Response

Control measure FSS-06 was included in the draft 2003 AQMP because of the significant need to seek additional emission reductions from existing mobile sources including off-road vehicles and equipment. The District does not anticipate a one size fits all control method approach for off-road categories affected by this control measures but rather that a menu of options for retrofits, including particulate traps, would be used to achieve the emission reduction goals of the measure. The District is aware of a currently available CARB verified retrofit system for off-road equipment that consists of a diesel oxidation catalysts (DOC) and the use of emulsified diesel fuel (PuriNOx). Although not a retrofit system, PuriNOx alone is also CARB verified. Other systems that are currently being evaluated but not yet verified are diesel particulate filters (DPFs) with low sulfur fuel. In some cases, such as for two-stroke engines and engines with low exhaust temperatures, there may be back pressure and loading problems. However, this technology should be compatible with construction equipment having four-stroke engines and those capable of handling the increased back pressure. In addition, DOCs combined with a crankcase vapor recovery system called Spiricle is on the horizon for off-road retrofits. This system is designed to reduce HC, CO, and PM. Also the Cleaire system which consists of a lean NOx catalyst and DPF and has been verified with CARB for on-road engines may also have the potential for off-road applications. Since this control measure is not scheduled for adoption until 2005 and implemented in the 2007-2010 timeframe, the District is confident that there is sufficient lead time for more retrofit systems to undergo verification by CARB for off-road equipment.

Comment

Cross-media and localized impacts, including environmental justice impacts, need to be identified and significant impacts mitigated or avoided to the greatest extent feasible.

Response

District staff concurs with the comment and has achieved this objective through the CEQA process. The Program Environmental Impact Report (PEIR) for the proposed 2003 AQMP, prepared pursuant to the California Environmental Quality Act (Public Resources Code §§21000-21178), is a comprehensive analysis of all potential adverse local and regional environmental impacts of the proposed project. The purpose of the CEQA analysis on various environmental topics is to identify potential significant impacts and propose feasible mitigation measures. The impacts of 2003 AQMP on geographic and demographic distribution are discussed in the Socioeconomic report.

The following comments were received relative to the measures proposed by CARB (presented in 2003 AQMP Appendix IV-B: State and Federal Element of the South Coast State Implementation Plan).

- The revision to control measure LSI-3 is welcomed, but its requirements are confusing, the measure does not account for the user's motivations for choosing a particular forklift type, and it presents a possibly insurmountable burden to manufacturers who are in the process of developing equipment to meet existing standards with future compliance dates (i.e., 2004 and 2007).

- While generally supporting the retrofit concept in LSI-2, there is concern that the expense of producing retrofit kits for the tremendous variation of engines for forklifts would be enormous. The control measure should include a range for retrofits that considers the multitude of engine variations (and possible user modifications) and the cost-effectiveness and economic impact of the proposal. A preferred approach to reduce emissions from in-use equipment is an incentive program for replacement for older, higher emitting equipment.

- Regarding LSI-1, it is recommended that CARB modify the measure to ensure complete harmonization with U.S. EPA standards.

- More stringent emission limits on marine vessels under MARINE-1 can be supported if they are implemented in an economically fair and equitable manner.

- ON-RD HVY-DUTY-7 overlaps with some of the District's fleet rules. To avoid a duplicate set of regulations, CARB should consider an opt-out provision for vehicle fleets that are in compliance with similar local regulations.

- The consumer product measures should include a public education campaign to encourage consumers to use less-polluting products.

- The financial impacts of the following measures on local governments must be fully evaluated and appropriate modifications proposed to minimize implementation costs:
    - LT/MED-DUTY-1, Replace or Upgrade Emission Control Systems on Existing Passenger Vehicles
    - LT/MED-DUTY-2, Improve Smog Check to Reduce Emissions from Existing Passenger and Cargo Vehicles
    - OFF-RD CI-3, Implement Registration and Inspection Program for Existing Heavy-Duty Off Road Equipment to Detect Excess Emissions

  - ON-RD HVY-Duty-3: Pursue Approaches to Clean Up the Existing and New Truck and Bus Fleet
  - OFF-RD LSI-2: Clean Up Existing Off-Road gas Equipment Through Retrofit Controls
  - OFF-RD LSI-3, Require New Forklift Purchase and Forklift Rentals to be Electric

- The actual emissions of NOx and ROG from ground access vehicles for AIRPORT-1 and the assumptions made to calculate them should be presented. Also the vehicle miles traveled attributed to private passenger vehicles and how these figures were derived should be indicated.

- Control Measure AIRPORT-1 disproportionably seeks to control the emissions from commercial aircraft when in fact, significant emissions are generated from tactical military, business jets, turboprops, and general aviation aircraft. The role of turboprops, smaller business jet aircraft, and piston engine aircraft is substantial and should be reconsidered as part of the control strategy. Future mitigation efforts for airport related emission reductions should address these aircraft.

- Relative to remote airport terminals, the issues of security and full check-in of passengers (including ticketing for all airlines and baggage) and funding need to be resolved.

- The description of the light and medium-duty vehicle category should be updated to discuss the March 2003 changes to California's Zero Emission Vehicle program.

Response

The comments reference the control measures from the State and Federal Element of the AQMP. The overall control strategy and specific control measures specified in the State and Federal Element of the draft Plan have been developed by CARB. CARB staff is more technically qualified to analyze the feasibility and cost of these measures and provide responses to comments relative to their control measures. District staff will be forwarding all comments on the State and Federal Element of the draft Plan to CARB for their consideration. CARB staff will be evaluating these comments according to their own public review process prior to their Board adoption hearing.

The following technical comments were received relative to the computer modeling analysis for the 2003 AQMP (presented in Chapter 5 and Appendix V).

MAJOR COMMENTS AND ISSUES

Comment

VOC/NOx Carrying Capacity Calculation Not Necessarily Optimal: To determine the VOC/NOx emissions carrying capacity to achieve the ozone standard in 2010, the District: (1) determines a level of VOC/NOx/NH3/PM/SO2 emissions control to achieve the PM10 standard in 2006; and (2) assumes additional NOx controls and holds the level of NOx control in 2010 to a fixed amount and then determines the level of additional VOC control to achieve ozone attainment. However, this approach results in a majority of the VOC/NOx controls needed in 2010 being due to Section 182(e)(5) controls with no known control technology (i.e., the "black box" controls). It would appear prudent to iterate back to the PM10 control plan and look for other measures (e.g., more aggressive NH3 controls) so that we can back off on the level of NOx control needed for PM10 attainment in 2006 that in turns results in a higher NOx carrying capacity in 2010. As shown during the 1994 AQMP[1], due to the nonlinearities of ozone formation a higher NOx carrying capacity results in a higher VOC carrying capacity and less 182(e)(5) controls in the black box. There needs to be more iterations among the ozone and PM10 control plans to optimizes this process, rather then the initial PM10 attainment control estimate driving over control for the ozone attainment. This is especially important given the roll of Federal sources in the NOx reductions whose commitments to control may be impossible to achieve so that any shortfall will be born by the local stationary sources who have already been controlled to essentially the maximal extent reasonably possible. Furthermore, PM10 attainment in 2006 is projected to be achieved with very little additional controls. Only one monitoring site is projected to exceed the annual PM10 standard in 2006 under 2006 Base Case conditions, Ontario at 50.8 :g/m^3, that only has to be reduced by 0.4 :g/m^3 (0.8%) to achieve attainment (50.4 :g/m^3). This supports the notion that the draft 2003 AQMP should first determine the optimal VOC/NOx control scenario needed to achieve the more difficult ozone standard in 2010 and then look at the easier 2006 PM10 attainment issue.

[1] O'Donnell C., R.E. Morris, D.F. Shearer, and L. Kawasaki. 1995. "Development of an Alternative Ozone Attainment Plan for the Los Angeles Region for Use in the 1994 State Implementation Plan" presented at the 88th Annual AWMA Meeting & Exhibition, San Antonio, Texas. June 18 - 23.

Response

The tiered approach for the control strategy (e.g. PM10 first, followed by ozone) does not significantly impact the eventual ozone carrying capacity for VOC and NOx in 2010. Only nominal additional reductions in PM10 precursor emissions beyond baseline are included in the 2006 controlled scenario. These emission controls are directed at local sources such as aggregate facilities that contribute to site specific primary PM10. The PM10 NOx and VOC carrying capacities for 2006 are approximately 935 and 673 (Panning Inventory) TPD respectively. Projected 2010 baseline NOx and VOC emissions are projected to be roughly 780 and 630 TPD, lower than the attainment emissions for PM10. As a consequence, the PM10 "first" strategy did not impact the ozone carrying capacity.

Comment

Lack of Weekend Modeling Episode: Currently, ozone exceedances in the SoCAB are more likely to occur on a weekend day than a weekday. However, both ozone modeling episodes selected for the draft 2003 AQMP ozone attainment demonstration modeling are weekday episodes. This is a serious deficiency in the draft 2003 AQMP that must be corrected.

Response

The commenter is correct. Ozone exceedances are more likely to occur on the weekend. One primary weekend episode was monitored during the SCOS97 field program. Attempts were made by both CARB and District modeling staffs to simulate this episode. Unfortunately, the model performance (all models) was not acceptable. As a compromise, the August 1997 episode was simulated with an assumed weekend emissions inventory as a sensitivity simulation and is reported in Appendix V.

Comment

Model Selection: The District and CARB should be commended for their work in evaluating multiple models with multiple chemical mechanisms. In the end there were five model configurations all which achieved EPA's ozone model performance goals for 1-hour ozone SIP modeling (EPA, 1991). However, the models and their inputs contain many uncertainties that affect both the base case evaluation as well as the future year attainment demonstration. It appears that the final model selection is not based on scientific validity but rather based on which model estimated the highest peak ozone concentration, which would likely turn out to be the model that requires the highest level of emissions control for attainment and therefore the highest emissions reduction requirements in the black

box. Given: (1) the uncertainties in the models and modeling inputs; (2) the fact that all three models achieve EPA's ozone model performance goals; (3) the final model selected is the most out-of-date and least scientifically valid; and (4) the high level of emission reductions in the black box, it seems justified to select a more scientifically valid model that requires less controls in the black box and then use the next couple of years before the next AQMP cycle to refine the modeling tools and databases to determine whether the high level of controls in the black box are really needed.

Response

The District convened a panel of expert modelers to review the performance of the modeling analyses conducted for the AQMP. The expert panel recommended the use of the current science. However, they also recommended the use of relative reduction techniques to normalize the performance based upon the ability to recreate peak ozone concentrations. This analysis was conducted for the CALGRID simulations and is reported in the Proposed Modifications to the Draft AQMP. In general, when the model simulations are scaled based on peak recreation performance, the solution (i.e. projected ozone carrying capacity) converges.

Comment

Federal Control Measures: The draft 2003 AQMP has two scenarios, one with and one without Federal commitments to controls. If there are Federal control commitments that are not based on existing or impending Federal rules, then EPA will likely disapprove the SIP. In this case there is the potential that local sources may have to make up the short fall in emission reductions from the Federal control measures, which may be an extreme economic hardship for the region. Thus, it seems more appropriate to identify the optimal integrated PM10/ozone control plan that would be demonstrated to achieve both standards minimizing the level of black box controls and without relying on Federal commitments to controls.

Response

The AQMP will be presented in a Public Hearing to the District Governing Board with two options for the control strategy. Both options will be forwarded to U.S. EPA but, in the event that the U.S. EPA does not approve Option 1 (with reductions from federal sources), Option 2 will serve as the attainment demonstration of the 1-hour ozone standard, where the NOx carrying capacity will be higher without requiring the local sources to make up the difference.

Comment

Use of Relative Reduction Factors (RRFs): Many of the independent peer reviewers suggested projecting attainment by using the models in a relative fashion through relative reduction factors (RRFs) as recommended in the latest EPA draft guidance documents for 8-hour ozone and fine particulate. We believe that it would be useful for the District to use RRFs to estimate attainment of the ozone standard in 2010 using all five model configurations to corroborate the findings of the draft 2003 AQMP attainment demonstration and account for uncertainties in the models, model inputs and model performance. It is unclear why the District rejected this recommendation from the independent review panel.

Response

The comment is inaccurate since the District has conducted analyses to evaluate the relative impacts of RRF's. This is described further in the "Proposed Modifications to the Draft 2003 AQMP - Appendix V" document. RRFs normalize the ozone modeling performance analysis. An RRF approach was first applied to the CALGRID and CAMx simulations in accordance with the comments made by the peer reviewers. In addition, the RRF approach has been applied to the final CALGRID simulations and the results of the analysis suggests a VOC and NOx carrying capacity that approximates the UAM determined carrying capacity.

Comment

One-Atmosphere Modeling: Recent advances in air quality modeling have included a movement toward one-atmosphere modeling to address all air pollution issues using a unified common platform (e.g., Models-3/CMAQ, CAMx, etc.). This is because different air pollutants have common emission precursor species: VOC and NOx are both precursors to ozone, PM10, PM2.5 and visibility; CO is a common precursor to ozone and CO; NOx is a common precursor to ozone and NO_2. One-atmosphere models should be used to promote consistency, guard against benefits of controls for one pollutant resulting in adverse effects for another, and increase the reliability of the modeling and attainment demonstration through more thorough description of atmosphere processes and model performance evaluation. The Draft 2003 AQMP uses several different models for different pollutants and even different modeling techniques for the same pollutant at different averaging times (i.e., PM10). This is despite the fact that some of the models used are multi-pollutant. For example the UAM-AERO/LT estimates ozone, PM10, PM2.5, CO and visibility at an hourly to annual time scale but only the modeling results for annual PM10 and PM2.5 are used, the other results are not even reported. The selection of models appears to be based mainly on familiarity

and model performance that is not necessarily consistent with sound science and accurate and representative inputs. The use of many different models and approaches results in inconsistencies in the Draft 2003 AQMP that should be corrected. It also creates an impression of "model shopping". In the past the District has pioneered the use of photochemical grid models for ozone compliance being the first region to use the Urban Airshed Model (UAM) to design ozone control plans. The UAM is now out of date, is no longer listed as the EPA preferred ozone model and all other areas of the US have moved on to the new generation of nested-grid photochemical grid models. To the best of my knowledge, the District is the only area still using the out-of-date UAM for an ozone attainment demonstration. Clearly, the District needs to update their modeling capabilities to use a state-of-science consistent one-atmosphere modeling approach for all their air pollution issues. This work should be done over the next two years immediately after completing the 2003 AQMP so that the pressure and schedule of the AQMP cycle is not driving the decision making process.

Response

While the District has used state-of-the-art modeling for the annual PM10 and PM2.5 demonstrations, the UAM modeling platform used by UAM-AERO/LT can be improved. In addition, the modeling treated the episodic ozone separately from annual PM10.

We agree with the comment and plan to use a unified modeling approach in the future. When the AQMP modeling process began, there were no recommended model/chemistry packages available that adequately addressed the needs of all three pollutant analyses and the data requirements for the simulations.

Comment

Inconsistencies in Draft 2003 AQMP: Because so many different models are used in the Draft 2003 AQMP inconsistencies are introduced. The most glaring inconsistency is the differences in boundary conditions used in the PM and ozone modeling. The UAM ozone modeling for the August 1997 SCOS episode used NOx, VOC and ozone boundary conditions of, respectively, 0.003 ppb, 20 ppbc and 40 ppb (Table 3-7 pg. V-3-20). Whereas the UAM-AERO/LT used monthly varying boundary conditions that for August 1995 were 0.168 ppb, 11.7 ppbc and 20 ppb for, respectively, NOx, VOC and ozone. That is, the UAM-AERO/LT PM modeling used NOx boundary conditions for August 1995 that were approximately 60 times higher than used for the August 1997 UAM ozone modeling. The UAM-AERO/LT August 1995 ozone and VOC boundary conditions were also approximately a factor of 2 different than used in the August

1997 UAM ozone modeling. Clearly differences between August 1995 and 1997 cannot account for these large variations in incoming species concentrations (i.e., boundary conditions). The UAM-AERO/LT PM modeling and UAM ozone modeling should use consistent boundary conditions.

Response

The different analyses addressed different averaging periods and simulation episodes. The ozone analyses were focused on two modeling episodes that were extensively monitored. In addition, revisions were made to the boundary conditions in the analyses that were conducted following the release of the Draft 2003 AQMP to make the analysis more consistent with EPA recommendations and bring the PM simulation and ozone simulation NOx boundaries closer. The variable boundary conditions were used for the PM simulations to attempt to simulate monthly variations in observed ozone and PM10 at near boundary monitoring sites in the Basin. Unfortunately, little local information is available to quantify actual boundary conditions in the three seasons other than summer. While the boundary conditions used in the two analyses are not identical, they are consistent as they reflect the requirements for the episode ozone simulation and the annual PM simulation. In general, the ozone boundary conditions responded to the upper bound for the monthly varying PM10 boundary conditions.

Comment

Potential Compensatory Errors in Modeling Analysis: It appears that the selection of the primary ozone model is essentially based on the ability of a model to predict the observed peak ozone concentration without regards to science or quality of model inputs. The focus on the peak performance measure has resulted in the selection of an old ozone modeling system (UAM) that appears to have known compensatory errors. In particular, the UAM model is out dated and no longer recommended by EPA for ozone modeling. Just a cursory examination of the information provided in the draft 2003 AQMP reveals potentially compensatory errors where errors in one input or model formulation are potentially compensated for by errors in other inputs or model formulation:

- The chemistry photolysis rates used in UAM are know to be biased 15-20% too high based on current information (overestimation bias);
- CB4 chemistry was used that is known to be not as “hot” as the SAPRC99 chemistry that is believed to be more current (underestimation bias);
- CALMET meteorological fields were used that are not dynamically balanced thereby potentially producing spurious vertical velocities (uncertainties);
- Past analysis of emissions for the SoCAB suggest that VOC emissions and the VOC/NOx ratio of emissions are underestimated. The 2003 AQMP

emission updates using EMFAC2002 increase NOx emissions more than VOC suggesting that VOC emissions and the VOC/NOx emissions ratio is still understated (underestimation bias).

- The UAM NOx deposition rate is much faster than the current models (overestimation bias).
- NOx boundary conditions that is much too low for the mid-latitudes of the SoCAB (underestimation bias).

Response

We concur that there exists compensatory errors in the modeling analysis. These features have been identified in past modeling simulations regardless of which model/chemistry platform used. To address this issue, the District convened a panel of experts who collectively recommended the migration to a new modeling platform and chemistry package. The District has committed to making this migration and has included CALGRID/SAPRC99 simulations as supporting documentation as part of the "Proposed Modifications to the 2003 AQMP - Appendix V." Using an RRF approach, the CALGRID/SAPRC99 simulation defined a similar carrying capacity to that defined by UAM. While there exists compensatory errors in the analysis, the District staff believes that the carrying capacity estimation is accurate based on model performance in the 2002 "Mid-Course" assessments and through the results of the RRF approach applied to the CALGRID simulation.

Comment

24-Hour PM10 Attainment Based on Speciated Linear Rollback: Many of the highest 24-hour PM10 days in the SoCAB have large amounts of ammonium nitrate whose chemistry is highly nonlinear. In fact, modeling studies have suggested that on occasion NOx controls may actually increase ammonium nitrate concentrations in some portions of the SoCAB by speeding up photochemistry. However, the District has elected to use speciated linear rollback to demonstrate attainment of the 24-hour PM10 standard. Speciated linear rollback will assume ammonium nitrate will decrease linearly with NOx emission controls. The District is applying the UAM-AERO/LT photochemical grid model to address annual average PM10 attainment. The UAM-AERO/LT uses hourly model inputs so can also simulate 24-hour PM10 concentrations. The District states that it is not using the UAM-AERO/LT to address 24-hour PM10 issues because they did not develop day-specific inventories for the UAM-AERO/LT. Clearly day-specific inventories could have been developed for the few days under study, as they are routine done for the ozone modeling. In any event, the District should corroborate the results from the linear rollback using the UAM-AERO/LT

modeling results in a relative sense following the fine particulate attainment procedures in EPA's draft guidance that uses RRFs.

Response

Since California Phase II fuel reformulation reduced VOC emissions and reactivity, 24-hour average violations of the federal PM10 standard in the Basin have been isolated to days when high winds "natural events" have taken place in the Basin. On each of these days, secondary aerosols, including the routinely measured nitrate, and sulfate have been smaller fractions of the total particulate sample. Speciated linear rollback was used for the 24-hour attainment demonstration to provide a conservative approximation of the potential for an exceedance of the federal standard other than via a high wind event. UAM-AERO/LT episodic emissions inventories were not developed for the 1995 days (prior to fuel reformulation) that exceeded the standard. Staff are continuing to evaluate the model performance of UAM-AERO/LT for two episodes identified in the 1997 AQMP to assess the utility of using the model and that subset of the annual average simulation (regardless of the lack of temperature corrected day-specific emissions). Use of RRFs will be considered as part of that evaluation.

Comment

Questionable Meteorological Modeling: Most current regional air quality modeling studies use meteorological inputs generated by a prognostic meteorological model such as MM5 or RAMS. The meteorological inputs for the draft 2003 AQMP UAM modeling, however, were generated using the CALMET diagnostic wind model. CALMET does not adequately reproduce land/sea breezes, slope flows, terrain effects and other meteorological phenomena. Furthermore, completely different meteorological inputs were used for the CALGRID and CAMx modeling that were based on MM5 modeling results. However, the procedures used for running MM5 are of questionable scientific validity because terrain heights were arbitrarily cut in half and the MM5 estimated Planetary Boundary Layer (PBL) heights were re-scaled. Better meteorological modeling approaches based on current state-of-science techniques needs to be used in the future.

Response

The meteorological fields used in the ozone modeling analysis emanated from the data evaluated by the SCOS97 Meteorological Working Group and modeled by CARB and District Staff. As stated in the comment, both CAMx and CALGRID use MM5 mesoscale meteorological modeling directly (with limited preprocessing) as the basis of the meteorological model. The UAM analysis used

the extensive SCOS97 observational data set with a diagnostic model to generate the meteorological fields. The same observational data was used in the 4-dimensional data assimilation process by the MM5 simulation. Differences in the meteorological fields arise not only from the choice of meteorological model but the application of the fields in the air quality model to simulate dispersion and transport. As noted in a previous comment, output from the state-of-the-science meteorological models tend to be more mass consistent and are more readily merged with the air quality model. UAM's formulation results in variable cell heights and layer averaging of wind and temperature fields. As a consequence, the model ready meteorological fields are different from those generated and used by CALGRID and CAMx. There are differences in the primary impact areas of ozone formation between UAM and the other models on selected because of the UAM formulation. Staff has conducted sensitivity analyses to assess impact the variable cell height and layer averaging on model advection and transport. As previously stated, the District is committed to migrating to a more state-of-the science modeling platform for future attainment demonstrations.

SPECIFIC COMMENTS

Comment

The following are specific comments on Appendix V of the draft 2003 AQMP. Many of these comments are typographical or grammatical in nature, whereas others are more technical.

Chapter 2: PM10 Attainment and Visibility

Page V-1-2, Paragraph 3, use of UAM-AERO/LT: This is a big improvement over the UAM/LC model used in the 1997 AQMP and follows the recommendations of Morris, Emery, Kumar, Lurmann and Feldman (1998). Use of full-science gas-phase chemistry should improve the analysis and make it more accurate and reliable.

Page V-1-2, Paragraph 3, in regards to UAM-AERO/LT: "The model also incorporates a size dependent partitioning scheme that segregates particulate in the coarse and fine (PM2.5) modes." I thought that the partitioning of the PM into fine and coarse modes was done in the emissions and then input into UAM-AERO/LT. This statement makes it sound like the UAM-AERO/LT is internally growing and shrinking PM through accumulation, condensation, evaporation, etc. The statement should be made clearer.

Page V-2-2, Paragraph 3: "Linear rollback on particulate component species is used to demonstrate future year attainment of the 24-hour average federal and state

PM_{10} standards." As noted above under General Comments, the worst 24-hour PM10 and PM2.5 events frequently have a large secondary PM component (ammonium nitrate) whose chemistry is non-linear. Thus, linear rollback is an invalid method for performing an attainment demonstration for 24-hour PM in the SoCAB. As the District is performing PM modeling using a model with nonlinear chemistry that is generating 24-hour average PM concentrations (i.e., UAM-AERO/LT), it is illogical to use linear rollback when you have modeling results that account for the nonlinearities in the 24-hour PM concentrations.

Page V-1-2, Paragraphs 4-5, Annual PM10 attainment demonstration based on deterministic approach rather than just at the 5 PTEP sites: This is a good step forward toward protecting the health of people in the SoCAB to demonstrate annual PM10 attainment across the SoCAB rather than just at the 5 PTEP sites as has been done in the past. However, given the uncertainties in the PM inventories this should not be done blindly and should be performed with care. In addition, it appears that attainment of the 24-hour PM10 standard is just demonstrated at the PM10 monitoring sites which is less protective of the SoCAB population. The draft 2003 AQMP states that there "were concerns raised about the representative of the analysis give the high variability of primary particulate emissions from grid-to-grid", why these concerns only applied to annual PM10 and not 24-hour PM10 needs to be explained. I would guess there is more grid-to-grid variability in the 24-hour PM10 concentration than in the annual PM10.

Page V-1-3, Paragraph 3 regarding "UAM is the photochemical model, recommended by the U.S. EPA guidance…": This statement is no longer true as EPA has recently revised their air quality modeling guidance so this paragraph should be rewritten.

Pages V-1-4 and V-1-5 on ozone model selection: Why wasn't the UAM/FCM with SAPRC99 chemistry selected as one of the models to be evaluated to be consistent with evaluating CALGRID and CAMx with both CB-IV and SAPRC99 chemistry. CARB clearly prefers SAPRC99 as being more up to date and better science.

Page V-1-5, second line from bottom: Use of the SAPRC99 chemistry "increased" model performance. Not sure what that means. Suggest replacing "increased" with "improved".

Page V-1-6, Paragraph 2: Typo "CALDRID" should be "CALGRID".

Pages V-1-6 and V-1-7 "Mid-Course Ozone Simulation": The 2002 "Mid-Course" simulations is presented as an "independent test" of the model performance to help select a model for the attainment demonstration. However, it

appears likely that the higher ozone peaks of the UAM compared to CALGRID and CAMx models is in part due to compensatory errors with, for example, overstated photolysis rates compensating for understated VOC emissions and NOx boundary conditions. These compensatory errors would carry over to the 2002 "Mid-Course" simulation also. Thus, the model performance unpaired peak performance comparison test and the "mid-course" simulation test both test the same attribute of the model and fail to uncover flaws and compensatory errors in the modeling.

Page V-1-10 "Meteorological Episode Selection": Ozone exceedances in the SoCAB are now more likely to occur on a weekend day than a weekday. However, the draft 2004 AQMP selected two weekday episodes for the ozone attainment demonstration (August 5-6, 1997 and August 27-28, 1987). This is a serious deficiency in the draft 2003 AQMP that needs to be addressed.
Page V-2-2, Paragraph 2, reason why UAM-AERO/LT could not be used for 24-hour PM10 so that linear rollback was used: The reason stated why the UAM-AERO/LT model 24-hour PM estimates could not be used to address 24-hour PM attainment modeling was because the District elected not to develop day-specific emission inventories for the few key 24-hour exceedance days like they did for the ozone modeling. Instead they used linear rollback that, given the non-linear nature of secondary nitrate formation, we know is incorrect. The District should compare the episodic UAM-AERO/LT responses of the control strategies with the linear rollback results. This can be done in a relative fashion by comparing the UAM-AERO/LT Relative Reduction Factors (RRFs) with the linear rollback factors. Sensitivity analysis of photochemical grid PM models for the SoCAB have shown on occasion at some locations that controlling NOx emissions increases particulate nitrate concentrations which is the opposite signal linear rollback will give.

Page V-2-3, Paragraph 2, 9th line from bottom: Change "This orientation is aligned with the wind driven mass transport in the Basin" to "This orientation is aligned with the typical wind driven mass transport in the Basin" to be more accurate to account for the occurrence of Santa Ana winds.

Page V-2-5, last paragraph: "While the sampling frequency of PTEP was greater than the SSI, there were periods early in 1995 when only the SSI analysis was available." This statement is contradicted by the discussion on page V-2-4 on the PTEP sampling during 1995 as 1:6 day Q1, 1:3 day Q2 and 1:1 day Q3 and Q4. No mention was made of early periods in 1995 when there were no PTEP measurements available. Text should be changed to be consistent.

Page V-2-10, Paragraph 3: In regards to the SSI nitrate evaporation issue, PM10 is composed of many different compounds, some of which are not stable and easily volatilize. Each PM10 measurement technique has its own strengths and

weaknesses and artifacts. The definition of PM10 from a regulatory perspective is based on the EPA Federal Reference Method (FRM) for sampling PM10. EPA has selected the SSI HIVOL as its FRM. Thus, PM10 attainment is based on SSI HIVOL samples with the nitrate evaporation issue. Therefore, it can be argued for an attainment demonstration that the PTEP samples and UAM-AERO/LT modeling results should be adjusted to match the SSI HIVOL FRM PM10 measurements. Not suggesting that this should be done, but it would be more consistent with the EPA PM10 FRM.

Page V-2-11, Paragraph 2 on CMB used to apportion secondary organic compounds: The draft 2003 AQMP states "For example, CMB is easily implemented and will provide characterization of secondary organic compounds when a contemporary detailed set of emissions source profiles are available." I am not aware of standard applications of CMB easily providing source apportionment for secondary organic compounds. Can the District describe the tracer compounds that will be used to identify secondary organic compounds and how they intend to do this.

Page V-2-12, first paragraph: The statement the "UAM-AERO/LT utilizes the full Carbon Bond IV" I believe is incorrect. UAM-AERO/LT uses an extended CB-IV that treats biogenic olefins (terpenes) as a separate species OLE2, whereas anthropogenic olefins are treated by the OLE species. This is because biogenic OLE2 has aerosol yields and anthropogenic OLE does not. This statement should be clarified.

Pages V-2-13 to V-2-16 discussion on UAM-AERO/LT initial and boundary conditions (IC/BC): The UAM-AERO/LT BCs are inconsistent with those used for the ozone modeling, a common set of BCs should be used. The discussion on how the UAM-AERO/LT BCs were defined is confusing. It sounds like the procedure started out with an objective technique to define the BCs and then at the end adjustments were made solely based on model performance without any physical or chemical justification, which is model tuning and should be discouraged. The procedures for defining the BCs can be summarized as follows:

- Started with modified version of EPA clean background
- VOC speciation from 1994 AQMP (no new information?)
- NO and NO2 concentrations reduced 50% to 0.5 and 1.0 (no justification provided)
- BCs then adjustment using monthly adjustment factors from Costa Mesa observations scaling to maximum monthly value (seems somewhat objective).
- Based on model performance, a final adjustment was made by quarter to reduce the gaseous BCs by 0.25 form winter, 0.50 for spring and summer and 1.00 for fall (this looks like model tuning).

Page V-2-19, top 3 paragraphs: The discussion on the winds used to "characterize", "assigned" and "influence" the winds in the upper layers of the annual UAM-AERO/LT application is confusing. I think that the words "characterize" and "assigned" mean they were used as input in the HDWM wind model and "influence" was done internally in the model, but the explanation should be clearer.

Page V-2-19, last paragraph on "Rain Days": For the annual UAM-AERO/LT PM application 56 days (15% of the time) were characterized as "Rain Days" during which the mixing height was set to 2000 m AGL, wind blown dust emissions were reduced and photolysis rates attenuated by 40 percent. This is a big improvement over the 1997 AQMP where the UAM/LC model was stopped for rain days and clean background PM numbers substituted for the modeling results. However, the approach is still neglecting scavenging of PM and PM precursors through wet deposition. In-cloud rain out and below-cloud wash out are effective removal mechanism for PM that should be considered.

Page V-2-20 and V-2-21 on Linear Rollback: This approach is not valid for secondary PM species such as ammonium nitrate. According to Table 2-4 on page V-2-8, ammonium nitrate is a major component of many of the highest PM10 and PM2.5 events during 1995. According to this section, all PM10 exceedances since 1997 have been high wind events so maybe the nonlinearities in ammonium nitrate formation are not that important. Are any of the high wind 24-hour PM10 exceedance events since 1997 not covered under the natural event policy? Given that the District has UAM-AERO/LT modeling results for several of these high ammonium nitrate days during 1995 it would be interesting to compare the relative reductions in ammonium nitrate in UAM-AERO/LT versus those for linear rollback for the same days. This is an important issue for 24-hour PM2.5 attainment demonstration and the District should be gearing up with deterministic models that can treat these nonlinear effects.

Page V-2-21, first paragraph under "Emissions Inventory": "UAM-AERO/LT model is based on the annual average inventory …". This statement is incorrect. UAM-AERO/LT is a model, the inventory is an input to the model. The District elected to provide annual average emissions with day-of-week and monthly adjustments as inputs to the UAM-AERO/LT model. Please reword.

Page V-2-23, first paragraph discussion on paved road dust: A major change in the methodology for estimating PM emissions from paved road dust has been made from the 1997 AQMP. In the 1997 AQMP the District made a compelling argument that a cap on paved road dust emissions is needed because the algorithm fails to account for the depletion in the silt loadings and local deposition of emissions so that as VMT grows, in some cases, there was more paved road dust

emissions there was dust on the roadway so it was not mass conservative. However, for the draft 2003 AQMP they removed this cap and now estimate that paved road dust may be overestimated by a factors of two. The issue of re-entrained road dust, local deposition, and road dust emissions as a function of VMT, vehicle type and speed and is an area of current research. The cap used in the 1997 AQMP appears to be a temporary patch. However, why the patch was removed in the draft 2003 AQMP to generate a known biased inventory is unclear and should be explained better.

Page V-2-24, Fugitive Wind Blown Dust: The standard ARB wind blown dust emissions inventory uses monthly climate variables to generate monthly wind blown fugitive dust emissions that are inadequate for episodic modeling. Since implementation of the natural events policy, how many of the high wind blown dust PM10 exceedance days have not been natural event days? Current research is underway to develop episodic fugitive wind blown dust emissions inventories using wind tunnel study data, GIS characterization of land cover and day-specific hourly meteorological data. Both the Western States Air Partnership (WRAP) for the western US and Imperial County southeast of the SoCAB are applying this method. The District should examine this and other methodologies for generating episodic wind blown dust inventories.

Pages V-2-26+, UAM-AERO/LT Model Performance Evaluation: The District has set a PM component model performance goal of within 30 percent. According to Table 2-14, for all sites, species and averaged across all sites the 30 percent performance goal is met only half the time (18 out of 36 occasions). This result illustrates the challenges in performing PM modeling, the limitations in the current PM models and the state of our ability to develop reliable meteorological and emission inputs for PM modeling. The 24-hour PM performance evaluation suggests that the model is reproducing the seasonal variations in many PM components which promotes some confidence in the modeling results and represents a big improvement over the 1997 AQMP UAM/LC modeling that had little skill on the 24-hour basis.

Page 2-V-48+, Hot Spot Analysis: The PM emission inventory is notorious uncertain especially for primary PM and this discussion is fairly convincing that many of the PM "hot spots" are emission artifacts. This is one reason that the EPA draft guidance for demonstrating attainment for PM2.5 uses models in a relative fashion through Relative Reduction Factors (RRFs) to project future-year attainment.

Page V-2-55+, Future Year PM2.5 Projections: The projection of future year PM2.5 attainment does not follow the EPA draft document "Guidance for Demonstrating Attainment for Air Quality Goals for PM2.5 and Regional Haze",

Draft 1.1 March 27, 2000. The projection of PM2.5 levels should follow the latest EPA draft guidance for demonstrating attainment of the fine particulate standard. This section should be redone following EPA's draft guidance. (Note two typos: page V-2-55 second line from bottom "propose" should be "proposed" and page V-2-56 Table 2-26 "Total PM10" should be "Total PM2.5".)

Chapter 3: Revisions to the 1997 Ozone Attainment Demonstration Plan

Page V-3-1, first paragraph: Only 2 two-day episodes were used in the ozone attainment demonstration, August 5-6, 1997 and August 27-28, 1987. Neither of these episodes is a weekend episode. Given the fact that currently ozone exceedance days are much more likely to occur on a weekend day than a weekday in the SoCAB, this is a serious deficiency in the draft 2003 AQMP. Furthermore, it should be noted that most other areas of the country are running longer ozone episodes and EPA's thinking is toward modeling longer episode periods that span a synoptic cycle. The use of only two two-day episodes for the SoCAB ozone attainment demonstration neither of which includes a weekend appears inadequate.

Page V-3-2, Model Selection: These two pages has several statements that need more explanation:

- Paragraph 2 "EPA's guidance also promotes the use of state-of-the-art modeling systems provided they perform equal to or better than the reference model (UAM)" – UAM is no longer EPA's preferred ozone model so this statement needs to be removed.
- Paragraph 1, "The performance of CALGRID and CAMx to recreate the patterns of ozone in space and time exceeded those of UAM" – this suggest that the CALGRID/CAMx dynamically balanced MM5 meteorological inputs were better than the UAM diagnostic wind fields an raises questions why UAM was selected.
- Paragraph 1, "Both CALGRID and CAMx met EPA's baseline model performance criteria…however each model under predicted observed peak concentrations." – then why were they eliminated based on model performance.
- "UAM predicted peak concentration essentially matched the unpaired observed peak concentrations." – this is due in part due to compensatory errors in the model/inputs including too high photolysis rates and questionable meteorological fields compensating for too low NOx boundary conditions and too low VOC emissions inventory (i.e., too low emissions inventory VOC/NOx ratio).
- Paragraph 3, "Uncertainties in the application of the SAPRC99 chemistry and speciation of VOC from biogenic sources needed for

the SAPRC99 chemistry further complicated the evaluation of the CALGRID and CAMx simulations." – what does this mean? The most important biogenic VOC species in ozone chemistry is isoprene that is treated as an explicit species (ISOP). Thus the speciation of the biogenic VOCs into ISOP should not be that uncertain and the chemistry of ISOP in SAPRC99 is explicitly accounted for. This is in contrast to the UAM6.2 CB-IV chemistry that does not treat isoprene as an explicit species instead isoprene is speciated into two OLE and one PAR CB-IV species. Thus, it appears there are more uncertainties in the UAM6.22 CB-IV treatment of biogenic VOCs than in SAPRC99.

- Paragraph 4, "The decision to use UAM rests on the model's ability to recreate the observed peak concentration, coupled with its performance on the "mid course" simulation and the District's extensive experience with UAM in prior AQMPs." – As noted above, part of the reason UAM estimates a higher peak ozone concentrations is due to known overstated photolysis rates, suspect wind fields, and suspected overstated NOx deposition rate that compensate for too low boundary conditions and suspected low VOC emissions (or at least too low VOC/NOx emissions inventory ratio). These, and other unknown, compensatory errors will affect both the model's ability to recreate the observed peak and the "mid course" simulation so they are essentially the same test. The District's familiarity with the UAM and consistency with past AQMPs is a valid argument. However, the better sciences and better predicted ozone spatial alignment of CALGRID/CAMx argues for their use. This does not mean we shouldn't use the UAM, but we would have more confidence that the proposed control plan does not fall short or that it does not substantially over control if all three models were used to project future year 1-hour ozone attainment using the Relative Reduction Factor (RRF) approach contained in EPA's draft 8-hour ozone modeling guidance.

Page V-3-18, bottom paragraph: "UAM-AERO/LT", do you mean "UAM".

Page V-3-19 and Table 3-7 on Boundary Conditions: The draft 2003 states that "A modified version of the EPA continental average boundary conditions "EPA-Clean" for gaseous pollutants was used as a starting point for the boundary and model-top concentrations assignment." EPA guidance for the regulatory application of the UAM recommends using a 2 ppb boundary conditions (BCs) for NOx (NO+NO2) (EPA, 1991). The draft 2003 AQMP uses a 1.5 ppt NOx BC (i.e., 0.0015 ppb). That is, the NOx BC in the draft 2003 AQMP is over 1,000 times lower than the EPA recommendation. The NOx BC used in the draft 2003

AQMP is very low and cannot be justified. For example, Warneck (1988) in "Chemistry of the Natural Atmosphere" summarizes ground based NOx measurements at rural and mountain top sites in Table 9 on pages 462-463 and the NOx values range from 0.020 to 21.000 ppbv with most values around 1 ppbv +/- a few ppb. Thus, the draft 2003 AQMP 1.5 ppt (0.0015 ppb) values are clearly too low. Furthermore, as discussed under the PM10 modeling above, they are inconsistent with the NOx boundary conditions used in the UAM-AERO/LT modeling of August 1995 which were approximately 60 times higher than used for the August 1997 ozone UAM modeling. The ~20 ppbC VOC boundary condition used for the UAM modeling also appears a little too low. The UAM boundary conditions need to be corrected and the values selected better justified.
Page V-3-21, first paragraph: The RADFACTOR, or NO2 photolysis rate, in UAM is based on an interpretation of the work by Schere and Demerjian (1988). This document is over 25 years old! More recent work suggests that the NO2 photolysis rate in the UAM is biased high by at least 15%. This incorrect overstatement of the NO2 photolysis rate partly explains why the UAM predicts higher peak ozone than CALGRID or CAMx and represents a built in compensatory error in the model.

Page V-2-21, TGRADBELOW and TGRADABOVE: The UAM uses spatially constant hourly values for a vertical temperature gradient below and above the mixing height to obtain three-dimensional temperatures from the hourly surface temperature fields for the entire SoCAB domain. Given that the SoCAB domain includes over ocean, coastal areas, urban centers, mountains and desert regions all of which have different vertical temperature structures these inputs must be in error over much of the modeling domain.

Page V-3-21, Meteorological Model: The draft 2003 AQMP states, "the CALMET meteorological model was the primary tool used to develop the meteorological fields". However, on the next few pages it discusses the techniques used to develop some of the other meteorological inputs (e.g., mixing heights) and it is unclear if these are the algorithms in CALMET or whether separate analysis was performed that was used to replace the CALMET predictions. A table or paragraph listing each meteorological variable and whether CALMET predictions were not were not used would clarify this issue. CALMET employs a diagnostic interpolative model that cannot accurately simulate important meteorological processes such as land/sea breezes, slope flows, etc. Thus the finding that the CALGRID/CAMx simulations using the prognostic MM5 meteorological model estimates better spatial distribution of ozone than UAM is not surprising as the CALMET meteorological fields will not be dynamically balanced and will neglect important meteorological processes so will have some inherent errors.

Page V-3-28, paragraph 1: In talking about the CALMET wind modeling there is a statement "One drawback of inserting the MM5 output is the mismatch in the coordinate systems (UAM/CALMET on a UTM system and MM5 on a Lambert conformal grid." This statement is not true. CALMET is routinely run on a UTM or Lambert grid using MM5 as input in the CALMET MM5.DAT format.

Page V-3-41 and Tables 3-8 through 3-10 Statistical Evaluation: Ozone performance statistics are calculated using different observed ozone concentration cutoff thresholds for the different (1997 vs. 1987) episodes and even on different days for the 1987 episode. No justification is given for these differences and it could be interpreted as cutoff threshold shopping to achieve specific performance goals. One ozone concentration threshold should be used across all episode days as the first step, additional ones can be added but there should be some consistency at first.

Page V-3-47, Figure 3-33: It appears that the UAM predicts a peak ozone of 251 ppb in the modeling domain on August 6, 1997, yet this value is never mentioned in draft 2003 AQMP discussion even though the UAM performance for the unpaired ozone peak is the main reason for its selection as the primary model. Thus, looking across the entire modeling domain on an unpaired ozone peak basis, the UAM is overestimating the observed peak by over 30%, which exceeds EPA's performance goal. This appears to contradict the reason for selecting UAM. The severe ozone overprediction needs to be explained.

Page V-3-68, first paragraph: The discussion on emission uncertainties notes that the 1994 and 1997 AQMPs were criticized because "there was too much NOx relative to the amount of VOC" (i.e., the emissions VOC/NOx ratio was too low). However, for the draft 2003 AQMP the emission updates resulted in more increases in NOx that VOC driving the already too low emissions VOC/NOx ratio even lower. Thus, the concerns on the understatement of the VOC/NOx ratio in the inventory being too low in the past AQMPs appears to have been exacerbated in the draft 2003 AQMP. In the second paragraph on this page it discusses how the UAM NOx dry deposition rate is faster than the other more current CALGRID/CAMx models that suggests that UAM has a built in compensatory error with a too high NOx deposition rate that compensates for a too low VOC/NOx ratio in the emissions.

Response

These specific comments have been addressed in the Proposed Modifications to the AQMP document and in responses to the questions above.