REGULATORY · REGULATORY · ENVIRONMENTAL · SCIENCES

California EnSIGHT, Inc.
P.O. Box 97
Walnut Creek, CA 94597-0097

April 4, 2008

Dr. Jean Ospital
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar CA 91765

Dear Dr. Ospital,

Recognizing the significance of the issue and the need to accurately reflect concepts of risk, exposure and cancer rates in Southern California, the Western States Petroleum Association retained California EnSIGHT, Inc.[1] as experts to review the District's draft Multiple Air Toxics Exposure Study in the South Coast Air Basin III (MATES III) report and place relevant findings in context. I appreciate the opportunity to provide input into revising the draft report as well as the actions by you and District Staff to assist in this effort. At the recent March 13, 2008 Technical Advisory Group (TAG) meeting, the dual objectives of the report were stated to be risk communication to stakeholders and to assist the District in air quality planning efforts. Our comments are directed at improving the draft report in light of these objectives.

My primary concern with the report is that upper bound estimates of potential risk are repeatedly presented without adequate disclosure and description of what the assumptions are, what key terms mean, and the degree and magnitude of the uncertainty inherent in the estimates. Compounding this problem is the District's failure to place the estimate into a context or perspective that is understandable to the ordinary layperson and adequately explain the relevant limitations and caveats associated with the estimates. For example, that they are estimated probability values based upon assumed hypothetical conditions rather than an estimated risk for any specific person.

These material omissions have the potential to mislead stakeholders. Apparently they have done so based on comments made by stakeholders at the TAG meeting referring

[1] It should be noted that Dr. Michael Lakin, a principal at California EnSIGHT, Inc. and a TAG member, did not participate in preparing the comments contained in this document. The comments in this document should not be understood, inferred or implied to represent Dr. Lakin's opinions or views on the draft MATES III report. The comments presented herein are separate and independent of opinions and beliefs held or comments made by Dr. Lakin regarding the draft MATES III report.

to newspaper articles that reportedly state that diesel exhaust is responsible for 84 percent of the cancers in the South Coast Air Basin, while the estimated risk values attributable to diesel exhaust are less than 1 percent of the background cancer rate identified by the California Air Resources Board. Misinformed stakeholders are more likely to make choices that adversely impact public health and other endpoints. Clearly, the District does not wish to misinform stakeholders and decision makers and possibly cause poor policy choices that can lead to undesirable effects. The comments below are directed to the District for the purpose of remedying such concerns.

I. Process

The draft MATES III report was apparently planned for release in late 2007 and the TAG Technical Advisory Group (TAG) was to have an opportunity to review and comment upon the draft prior to public release. However, this did not occur. I am unaware that an explanation was provided to the public.

Instead the draft MATES III report, a press release summarizing the report, and most of its appendices was released on or about January 4, 2008 without prior TAG review or input. Comments from all stakeholders, including TAG members, are due today, April 4, 2008. Appendix IX was released about three weeks thereafter in late January. The TAG did have a single meeting to provide oral comments to staff on March 13, 2008, about three months after the report's release to the public. Between the release of the report and the TAG meeting, SCAQMD had seven public meetings between February 27 and March 10 to describe the findings in more detail and answer questions from stakeholders.

The TAG review should have occurred before the release of the draft to the public and before meetings with the public. At this point, it seems too late for the TAG to have meaningful input and an opportunity for thorough review before comments are due in the first week of April. Furthermore, if errors are identified, it may be difficult for the District to explain such errors to the public and retain its confidence and credibility. For MATES IV, TAG review should be performed prior to public release and meetings with the public describing the findings, the TAG should be provided all necessary backup and intermediate data files, and the TAG should be afforded sufficient time to thoroughly review the draft before it is released to the public.

Unfortunately, given the TAG review process to date, their review and input seems to have been accorded little import by the District in developing the draft report. Hopefully the District will encourage, accept, and incorporate the TAG comments upon the draft report, modifying it accordingly.

II. Objectives of the MATES III Report

A. Report’s Stated Objectives are Incomplete

The objectives of the draft MATES III report identified by staff at the March 13, 2008 MATES III Technical Advisory Group (TAG) meeting can be placed into two broad categories: (1) risk communication to stakeholders; and (2) air quality planning , i.e., something analogous to the State Implementation Plan for priority pollutants. These objectives are not identified in the text of the report.

Page1-1 states “*The objective of MATES III was to characterize the ambient air toxic concentrations and potential exposures in the Basin*.” At best, the stated objective is incomplete and seems to confuse the report’s dual objectives of risk communication and air quality planning with a portion of the information content used to achieve these dual objectives.

The objectives described in the text should be modified to explicitly include:

(1) risk communication to stakeholders to enable them to make informed decisions; and
(2) air quality planning for air toxics by the District analogous to the State Implementation Plan for priority pollutants.

A widely accepted approach to risk communication is explained in the National Research Council (NRC) publication *Improving Risk Communication* (1989). The guidance contained in the NRC document is recommended to be applied to the MATES III report and subsequent risk communication efforts by the SCAQMD.

B. Fundamentals of Risk Communication

According to the NRC, the primary goal of risk communication is to inform individuals about potential risks so that they may make informed decisions regarding those risks. It is essential for stakeholders to make informed decisions regarding such matters in a properly functioning democracy.[2] If stakeholders are inadequately informed or misinformed, the decisions they make may exacerbate the problem or cause other unintended adverse effects.

Risk communication can be considered successful only to the extent that it is accurate, understandable, and complete within the limits of available knowledge. Accuracy and completeness includes presenting the best available data, including conflicting data and uncertainties. The risk information must be accessible to the stakeholders at two levels. First, the risk message must be understandable to the stakeholders. Second, stakeholders must be able to understand how the information was developed, i.e., the process must be transparent.

---

[2] See generally, National Research Council, *Understanding Risk: Informing Decisions in a Democratic Society*, 1996.

Keep in mind that good risk communication may not make the situation better, but poor risk communication nearly always makes the situation worse. Stakeholder's decisions are much more likely to be detrimental when risk communication fails, that is, when stakeholders are misinformed. Therefore, the risk communication by SCAQMD should be accurate, complete, and understandable to the layperson to enable stakeholders to make informed decisions rather than misinforming them and making the situation worse.
C Information Must be Accurate and Complete

1. Identify the Use and Limitations of the Information

The intended use and limitations of the estimates of potential risk must be expressly identified throughout the document, including the Summary, Chapter 2.7 Cancer Risk Estimates, Chapter 4.7 Estimation of Risks, and Chapter 6.3 Key Findings. At these sections, the report should state:

"*The risk values presented in this report are rough, broad geographically-based estimates of potential cancer risk developed solely for the purposes of risk communication to stakeholders and air quality planning by the District within the South Coast Air Basin. For consistency with prior MATES reports and the AB2588 program, the risk estimates were derived using standard OEHHA AB2588 risk assessment guidance. A number of health-protective assumptions in the risk assessment methodology were made in order to avoid underestimating the potential risk from exposure to air toxics. The risk estimates are not intended to apply to any specific person at any particular location. The estimated risk level for any person at any location will vary due to site-specific parameters, including but not limited to the person's behavior, sources present, (including their stack characteristics, operating patterns, equipment technologies, etc.), and meteorology. "*

2. Include All Relevant Information and Avoid Ambiguity

In a January 4, 2008 press release summarizing the key findings of the draft MATES III report, the SCAQMD states:

"Diesel exhaust accounts for approximately 84 percent of region-wide cancer risk and mobile sources -- including cars and trucks as well as ships, trains, aircraft and construction equipment -- account for 94 percent of the total risk"

The MATES III report derived estimates of cancer risk attributable to sources of air toxics; it did not estimate the cancer risk for the region from all sources, known and unknown. Based on comments at the TAG meeting, the press has reportedly stated that the MATES IIII report finds that diesel exhaust is responsible for 84 percent of the cancers in the air basin. The press' misunderstanding seems to be based upon an incorrect interpretation of this ambiguous press release and the District needs to remedy this misunderstanding immediately now that it has been brought to the District's attention.

To remedy this problem, other comparisons should first be made to place the risk estimates into context for stakeholders, such as a comparison to the background cancer risk from all sources, known and unknown, as described in Section II.C.2 below. Then, the text should be revised to include all relevant information, minimizing the potential for misleading interpretations as described further in Section II.C.2 below.

3. Assumptions and Uncertainties Must be Expressly Identified

The reported risk values need to clearly identify the assumptions and uncertainties in the values used in each phase of the report. These assumptions and uncertainties in each phase of the report are generally as follows:

a. Exposure Levels Based on Air Dispersion Modeling – the assumptions and uncertainties associated with this phase of the report includes:

i. Emissions inventory modeling: source activity patterns, duty cycles, emission rates, locations of sources, emission rates, etc., and assuming that the estimated emission rates remain constant for the next 70-years. As pointed out by Dr. Charles Lapin at the TAG meeting, MATES reports should also take into account the projected changes in emissions in its estimates of potential cancer risk based on the assumed 70-year exposure interval.

ii. Air dispersion modeling – modeling input assumptions, meteorology, model performance, etc.

b. Exposure Levels Based on Air Monitoring – the assumptions and uncertainties associated with this phase of the report include attribution of a non-specific pollutant, elemental carbon (EC), to specific sources (diesel engines, gasoline engines, cooking, etc.), the ability of monitoring locations to reflect representative concentrations for nearby regions, the concentrations based on monitoring data assumed to remain constant over 70-years, etc.

c. Human Behavior – the assumptions and uncertainties associated with this phase of the report include assuming that a person will remain stationary outdoors at a single location 24 hours per day, 365 days per year for 70 years. The estimated risk will be dependent on assumed breathing rates, but I was unable to locate the where the assumed breathing rate was stated in the report.

d. Toxicity Assessment – the quantitative estimate of carcinogenic potency of the evaluated chemicals is inherently uncertain. The uncertainties of those chemicals that are responsible for the greatest proportion of the estimated potential cancer risk, such as diesel emissions, benzene and other volatile organic chemicals (VOCs), should be identified and described.

e. Derive an Estimate of the Overall Uncertainty in the Estimated Risk – given the number of steps in estimating the potential cancer risk and the degree of uncertainty at each step, the sum of these uncertainties should be estimated, described and compared with the overall risk estimate to provide a range of potential risk based upon all of the assumptions used to derive the estimate of potential risk. It should be noted that Dr. Lapin made this suggestion at the TAG meeting.

All of these sources of uncertainty should be identified and described in the Executive Summary and in Chapter 6, Findings and Discussion. The current description of the uncertainties on pages ES-5 and ES-6 is woefully incomplete. The following is proposed to replace the current text addressing uncertainties in the Executive Summary:

"*The estimated risk values presented in this report are based upon a variety of data and assumptions. The estimated exposure levels of toxic air pollutants evaluated were developed from air monitoring data and through air dispersion modeling. Substantial uncertainty is inherent in the estimated air concentration values derived using both methods. Emissions from diesel and gasoline engines are responsible for a very large proportion of the air toxics evaluated, consequently, the uncertainty in estimating such emissions and predicting air concentrations throughout the South Coast Air Basin ultimately translate into uncertainty in the estimates of potential risk. As for the monitoring data, there is no direct method to measure diesel engine exhaust in ambient air. This limitation results in uncertainty in estimating its concentration in ambient air using the monitoring data. Furthermore, emissions are anticipated to change in the future as more stringent control measures are introduced and the various source categories increase or decrease activity, creating additional uncertainty in estimating cancer risk over a 70-year exposure period.*

Compounding the uncertainty in developing air concentrations for the air toxics evaluated are the uncertainties associated with estimating their carcinogenic potential. Typically, cancer potency values are based upon studies on experimental animals or human workers exposed to much higher amounts of the chemical than the levels present in the ambient air. This introduces uncertainty in predicting the effect of the chemical in people exposed at much lower ambient levels. Compared to all other air toxics evaluated, the uncertainty in the cancer potency estimate for diesel exhaust has the greatest impact on risk estimates presented in this report. The California Air Resources Board Science Review Panel adopted a unit risk factor for diesel exhaust in 1998, but other bodies reviewing this data, including the United States Environmental Protection Agency and the Health Effects Institute, concluded that the data was inadequate to develop a reliable quantitative estimate of cancer potency . As a result, the USEPA does not derive quantitative estimates of cancer risk from exposure to diesel exhaust. This difference in science policy illustrates the uncertainty in deriving a reliable estimate of the cancer risk attributable to diesel exhaust exposure.

Cancer risk estimates are also dependent on assumptions made regarding human behavior and breathing rates. Risk estimates are based upon the assumption that a person will be present outdoors and remain stationary at one location 24 hours per day, 365 days per year for 70- years. This behavior is not typical of residents in the South

Coast Air Basin, therefore, the risk estimates derived based on these assumptions are not directly applicable to any specific person at any specific location.

The objectives of this MATES III report is to provide risk communication information to stakeholders and assist the District in future air quality planning efforts. The District has used the same health-protective assumptions in the risk assessment methodology that it uses in making air toxic permit decisions for new equipment. This policy has the effect of biasing the risk estimates upwards, thus the actual risk is likely to be less.

C. Risk Information Must be Understandable to Stakeholders

1. Explain What a Quantitative Cancer Risk Values is to Stakeholders

Few stakeholders are likely to understand what the quantitative cancer risk values presented throughout the report represent. This was apparent given the confusion that erupted at the TAG meeting regarding this topic. Furthermore, the MATES III report neither describes nor defines the quantitative cancer risk values presented. If stakeholders do not have an understanding of what the risk values represent, then risk communication will be impaired because it is incomplete. The report should describe what these values represent. For example:

"The quantitative cancer risk values estimated in this report represent the increased probability that a person will develop cancer over 70 years based upon the estimated exposure concentrations and all of the assumptions, including cancer potency estimates, identified in the report. These values are estimates of theoretical risk to a hypothetical person, not the actual risk to any real person."

2. Compare Estimated Risk Values to Background Cancer Risk

Compounding the problem of failing to describe to stakeholders what the risk estimates represent, the MATES III report is also deficient in providing information to stakeholders allowing them to put the risk estimates into context. In other risk communication documents, comparing the incremental cancer risk estimates attributable to the condition being evaluated to background cancer risk is a common practice. For example, in a recent risk assessment performed by the California Air Resources Board (CARB) for West Oakland, the background cancer risk of 200,000 per million or more was used as a reference point for comparison. [3]

The risk estimates presented in the draft MATES III report based on monitoring data were reported to range from 870 to 1,400 per million and a population-weighted risk of 812 per million based on modeling. [4] These incremental risk estimates are less than 1% of the background cancer risk identified by CARB. Of course a side-by-side comparison of background cancer risk (actuarial risk) and estimated air toxics risks can

3 Draft *Diesel Particulate Matter Health Risk Assessment for the West Oakland Community, Preliminary Summary of Results*, March 19, 2008 at p.8.
[4] Pages ES-3 and ES-5.

be misleading since the estimated risks are based on multiple theoretical assumptions which may or may not be true. If some of the assumptions are not true risk (e.g. linear low dose extrapolation with no threshold for effects) the actual ambient air toxics risk may be as low as zero. Nevertheless, the readers of the draft MATES III report (and the press releases associated with it) need to have the estimated air toxics from MATES III put into perspective with current background risks. An explanation of the nature of actuarial risk versus theoretical risk is an important component of such comparisons. It is especially important for those responsible for making risk management decisions to understand these issues.

3. Explain How Estimates Are Derived

The report provides good explanations of how values are derived in some sections, but not very well in other sections.   Furthermore, the data are not provided in the report or its appendices to enable one to reproduce the values reported.   For example, it remains unclear how estimates of the concentrations of diesel particulate matter (DPM) using the monitoring data were derived.   Where do the emission rate values in Table 2-4 come from? How were these values derived from the 2005 inventory? What document was used? What page? What table? Where are these numbers located in the cited document?

The same concern exists for estimates based on the CMB method. The back up or intermediate data, including modeling input files should be made available and the methods used to derive such values should be described in more detail in the report and its appendices. I am aware of the District's efforts since mid-March to provide this data, but it should have been made available to all stakeholders much earlier than 2 weeks before comments were due.   Given the interest and controversy of prior MATES reports, requests for back-up and intermediate data were foreseeable. Providing it at such a late date limits an opportunity to thoroughly review the basis for the report's conclusions and obscures the transparency of the process. Transparency in methodology is critical for stakeholders to understand what the risk estimates represent and their degree of uncertainty.

D. Comparisons with MATES II Are Confusing

It appears that emissions have decreased since the MATES II report and risks have also decreased. However, as discussed at the TAG meeting, the relationship between emission reduction and risk reduction is unclear because the explanation of the limitations in comparing risk estimates presented in MATES II with those in MATES III is confusing. The ensuing discussion of such comparisons and confusion at the TAG meeting illustrates this point. Limiting comparisons to only total risk estimates from all air toxics evaluated will likely minimize the confusion resulting from such comparisons.

III. Estimated DPM Concentrations and Risks Based on Monitoring Data

A. Seasonal Analysis

The District needs to perform and provide seasonal analysis examining how the measured concentrations of key risk driving chemicals, like EC and benzene, varied over time and by monitoring location. For example, Dr. Doug Lawson stated that EC emissions from gasoline vehicles due to starts in colder temperatures in the winter are much greater than starts during warmer temperatures in the summer. Seasonal analysis would aid in assessing the reliability and accuracy of DPM concentration estimates derived using the CMB method.

B. Weekday v. Weekend Monitoring

Future monitoring for MATES IV should be structured for weekday v. weekend periods to allow for the evaluation of differences between weekdays and weekend air concentrations. As described by Dr. Lawson, this will enhance the ability to differentiate diesel v. gasoline contributions in EC. To the extent that such data is developed, it should be compared with estimates of DPM derived through CMB or other methods to assess the accuracy of these method using EC or other compounds as markers or surrogates for DPM.

C. Table ES-2 DPM Concentrations Do Not Yield Risk Estimates in Table ES-2

The product of multiplying the DPM concentrations reported in Table ES-2 with the CARB Science Review Panel adopted unit risk factor (URF) of 3×10^{-4} $(\mu g/m^3)^{-1}$ (or 300 per million) are not equal to those values reported in Table ES-2.

2.16 $\mu g/m^3$ x 300 per million = 648, not 854 per million
3.1 $\mu g/m^3$ x 300 per million = 930, not 1,133 per million
3.20 $\mu g/m^3$ x 300 per million = 960, not 1,194 per million
3.49 $\mu g/m^3$ x 300 per million = 1,047, not 1,194 per million

The values in Table ES-2 could not be reproduced.

D. DPM Estimation Methods

1. On p. ES-3 it states that MATES II may have underestimated risk from DPM because the MATES II methodology underestimates DPM as compared to the methodologies used in MATES III (2005 Inventory Method and Chemical Mass Balance [CMB] Method). However, the information presented in the MATES III report and its appendices limit the ability to understand how the 2005 Inventory Method and CMB Method estimates were derived and to ultimately reproduce them. Given this lack of information, it is not possible to determine if the values estimated using the MATES II Method (PM_{10} EC x 1.04) are any more accurate and reliable in estimating the true DPM concentration as compared to the 2005 Inventory Method and CMB Method using either

of the gasoline profiles. More information should be provided to enable reproduction of the DPM estimates by the 2005 Inventory Method and CMB Method. To the extent that the MATES II Method estimates differ from the 2005 Inventory Method and CMB Method using either of the gasoline profiles, no validation is provided demonstrating why one method as applied is any more accurate and reliable in estimating the true DPM concentration than the other two methods as applied.

2. 2005 Inventory Method

Multiplying the measured $PM_{2.5}$ EC concentration by 1.72 yields the estimated $PM_{2.5}$ DPM according to the 2005 Inventory Method as described on p. 2-9. Table 2-4 indicates that the 1.72 factor is derived by dividing annual $PM_{2.5}$ Diesel PM emissions of 26.06 tons per year (TPY) by the annual $PM_{2.5}$ EC emissions of 15.17 TPY. The source and method used to derive the annual emission rates of $PM_{2.5}$ EC and DPM presented in Table 2-4 is not stated in Chapter 2. However, page 3-1 does state that the 2007 AQMP was used as the basis for the toxics emissions inventory for MATES III. If the 2007 AQMP was used as the basis to derive the $PM_{2.5}$ Diesel PM emissions estimate of 26.06 TPY and $PM_{2.5}$ EC emissions estimate of 15.17 TPY presented in Table 2-4, please cite the page, table, etc. where this data is presented in the 2007 AQMP. For transparency, the data and method used to derive the annual emission estimates for $PM_{2.5}$ EC and DPM should be provided in the report and its appendices to enable stakeholders to reproduce these values.

The annual estimates for $PM_{2.5}$ EC and DPM reported in Table 2-4 appear to be inconsistent with those reported in Table 3-4. In Table 3-4, the daily diesel PM emission rate is reported to be 60,390.1 lbs per day (equivalent to 30.2 tons per day [TPD]), while EC is reported to be 41,472.0 lbs/day (20.7 TPD). The values in Table 3-4 are 433 times greater for DPM and nearly 500 times greater for EC than those in Table 2-4. Explanation for the differences in DPM and EC emission rates Tables 2-4 and 3-4 is needed.

Table 3-4 should include estimates of $PM_{2.5}$ EC and DPM too as well as the cite to the page and/or table of the source document from which these values were taken.

3. CMB Method

How the estimates of DPM were derived using the CMB method is unclear. The description and data provided in Chapter 2 and Appendix VII is insufficient to enable stakeholders to understand and reproduce the results. More detailed description of how the estimated DPM concentrations were derived, including all information necessary to enable stakeholders to reproduce the results for all monitoring sites, should be provided. The uncertainty estimates for each monitoring location at each time point should also be provided. Seasonal analysis of the CMB modeling should be performed.

The CMB model reports performance statistics for each application, including measures of potential co-linearity issues for specific source profiles as well as comparisons of observed and predicted total mass and element-specific mass. Tendencies to over- or underpredict total mass or specific elements/species can be indicative of unexplained or unrecognized emission sources, as well as overall bias in source attribution arising from the selection of specific fitting species. Hopefully, these outputs were carefully reviewed during the course of the CMB modeling. The results of such reviews, as well as the full CMB outputs should be provided to the TAG.

4. Increase in $PM_{2.5}$ EC Not Fully Explained by Increase in VMT

As shown in Table VI-6, the average $PM_{2.5}$ EC across all sites increased approximately 16%. The purported cause of this increase was identified to be attributable to increased trucking activities that resulted in a 13% increase in vehicle miles traveled (VMT).[5] A 13% increase in VMT for heavy heavy-duty (HHD) diesel vehicles or all on road diesel is incapable of causing a 16% increase in total $PM_{2.5}$ EC from all sources.

As shown in Appendix VIII, the total $PM_{2.5}$ EC emissions is 41,472 lbs per day, HHD accounts for 4,532 lbs $PM_{2.5}$ EC per day (11% of total) and on-road diesel accounts for about 10,498 lbs per day (28% of total). A 13% increase in $PM_{2.5}$ EC from HHD results in an additional 589 lbs/day, while a 13% increase in on-road diesel results in an increase of about 1,365 lbs/day. If only HHD increases 13%, the total increases to 42,062 lbs/d, about a 1.4% increase. If all on-road diesel increases 13%, the total increases to 42,837 lbs/d, about a 3.3% increase. The source of the remaining 13-15% $PM_{2.5}$ EC increase is unexplained. The District should acknowledge that at most, 20% of the increase in $PM_{2.5}$ EC may be attributable to on-road vehicles, but that approximately 80-95% of the increase in $PM_{2.5}$ EC remains unexplained.

IV. Modeled Data

A. Emissions Inventory Estimates

The emission inventory estimates used as input for the air dispersion modeling as based upon a series of assumptions for four basic source categories: (1) stationary/point sources; (2) area sources; (3) on-road vehicles; and (4) off-road mobile sources. Overall, the on-road and of-road mobile contribute the greatest proportion of emissions and risk. There are many assumptions regarding use and activity of these sources that have a large impact on emissions. For example, DPM contributes the greatest risk and according to Table 3-4, off road sources contribute over 60% of the diesel emissions. The CARB OFF-ROAD Model was used to develop emission estimates for off-road sources. The assumed engine load and duty cycle are highly variable depending on activity and use, therefore, the accuracy of the predicted emissions is uncertain. The assumptions used in the CARB OFF-ROAD Model are a key driver in the overall risk estimates. A sensitivity analysis should be conducted to examine how the assumptions in the CARB OFF-ROAD Model affect overall risk estimates.

[5] See p. VII-13.

B. Air Dispersion Modeling

1. Model Performance Evaluation

No independent verification of model performance, if performed, was provided. The CAM-X base case simulations were presumably subjected to rigorous performance evaluation for selected species, both inert and reactive. This may have been reported in a separate document, however no citations for such work are provided. This analysis should be made available to the TAG.

2. Model Reconciliation

Perhaps of greater concern is the comparison of predictions of toxics concentrations from dispersion modeling and CMB described in greater detail in below. For analyses in which there exist substantial uncertainties in modeling inputs, the model reconciliation step should include a careful assessment of areas of agreement and disagreement between the two approaches.

The results presented suggest significant geographic biases, with dispersion modeling tending to overpredict air toxics (relative to CMB) at sites near the ports and in the western portion of the domain, but to underpredict at sites in the eastern portion of the domain. Several alternative hypotheses can be made regarding the cause of this bias, and these should be explored and presented in the final report. They include:

a. Meteorological model results that underpredict vertical dispersion in coastal areas and overpredict this dispersion in the inland areas;

b. Emission inventory bias such as overly high assumed operating hours and load factors for cargo handling equipment in the ports, and undercounting or underestimation of the amount of HDD truck activity at distribution centers in the eastern part of the domain;

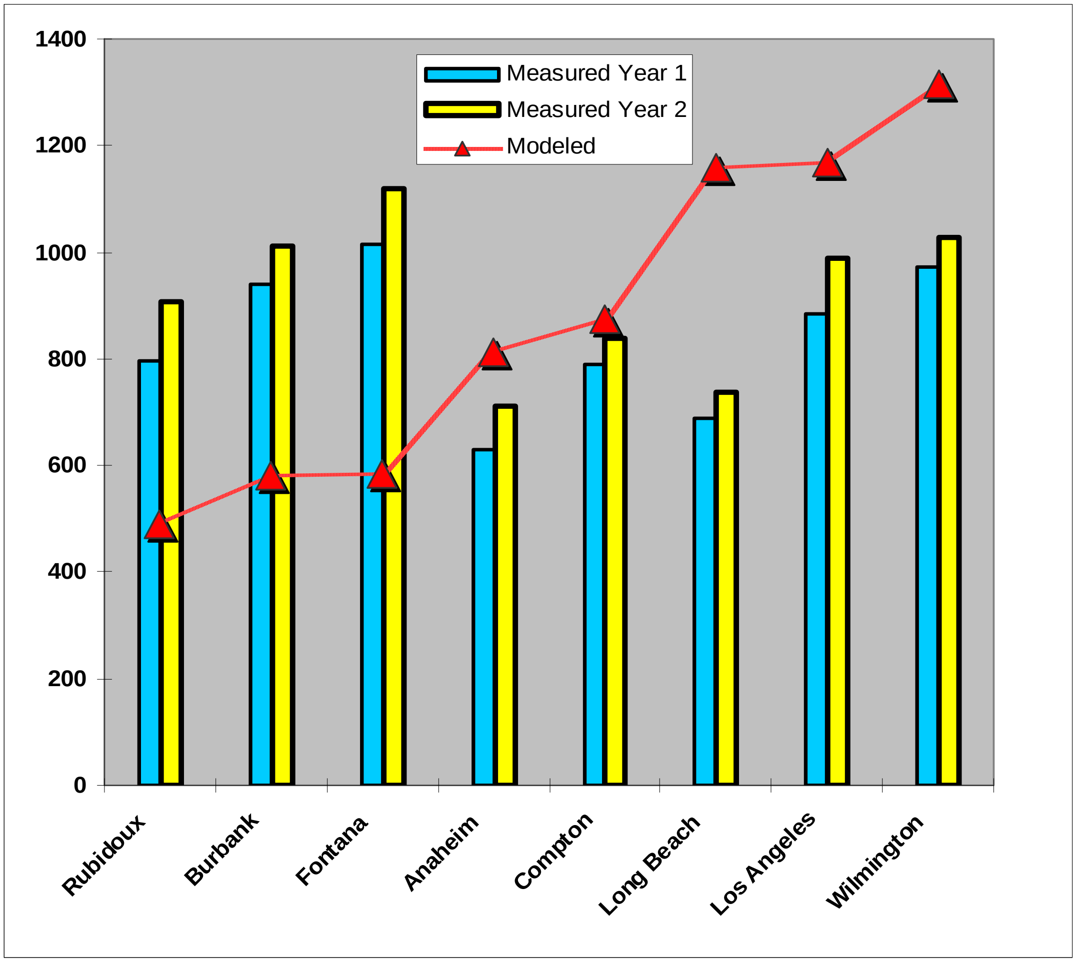
c. Unrecognized differences in the actual source profiles with different relative contributions (e.g., off-road diesel cargo handling equipment, ships, and on-road diesel trucks); and

d. Uninventoried sources. The discrepancies between the dispersion modeling and CMB results are sufficiently large as to warrant examination and reporting of efforts to determine their cause(s).

3. Monitoring and Modeled Results Do Not Agree

Risk estimates based on monitoring data are presented in Figures 2-17 and 2-18 for Years 1 and 2, respectively. The values are not presented in a table. For DPM, they appear to be based on the average values derived using the MATES II method, the 2005 Inventory Method and the CMB Method with both gasoline profiles. Risk estimates based on modeled data are presented in Table 4-5. The DPM air concentrations used to derive the risk estimates can be identified by dividing the risk estimate attributable to DPM by its CARB SRP URF value.

Figure 1. MATES III Estimated Risk Values at Monitoring Locations



As shown above in Figure I, the model both under-predicts and over-predicts DPM concentrations at different locations. The data suggest that the sites that have the lowest risk values as indicated by the modeling method have among the <u>highest</u> risk values based on the monitoring data. The monitoring data indicates an average risk that is about 2X higher than that predicted by the modeling data for 3 of the 8 sites (Rubidoux, Burbank and Fontana). Similarly, 3 other of 8 sites (Long Beach, Wilmington, and Los Angeles) with the highest risk based on modeling have risk estimates based on monitoring ranging from about 25 -60% less.

Both methods of estimating DPM concentrations produce inconsistent results that are typically within a factor of 2. This difference between the modeled and monitoring data at the fixed monitoring locations should be identified, highlighted, and discussed in the report, including possible explanations, in order to inform stakeholders of the uncertainty in estimating DPM concentrations using both modeling and monitoring data.

The key point to express in the report is that the District does not know what the actual annual average concentration of DPM is at any location within the South Coast Air Basin given the limitations and uncertainties inherent in the methodologies. The District can, however, derive a number of estimates of the annual average concentration of DPM using modeling and monitoring methodologies. At some locations these estimates converge and are quite close (Compton), while at the majority of the locations the estimates diverge and may differ by a factor up to 2, in part, because of the limitations and uncertainties inherent in the methodologies.

The divergence between estimated DPM concentrations and corresponding risk values should be explained in detail to enable stakeholders to understand why the risk estimated using one methodology differs from the risk estimated using the other method. For example, if the modeling is assumed to provide the more reliable estimate, why is the risk estimated using the monitoring data about twice as high in Fontana? On the other hand, if risk estimated using the monitoring data is assumed to be more reliable, then why is the risk estimated using modeling over 60% greater in Long Beach?

The report should clearly explain that the estimated DPM concentrations are rough approximations using multiple methodologies each with its own limitations and inherent uncertainties, and as a result risk estimates based on these values also incorporate these limitations and uncertainties. The bottom line being that the risk estimates presented in the report are rough estimates that incorporate substantial uncertainty, but are adequate for the sole objectives of the report - risk communication to stakeholders and District air quality planning. The risk estimates, however, are inadequate or inappropriate for estimating the potential cancer risk to any specific person at any location within the South Coast Air Basin and should not be applied for any other purpose other than the stated objectives.

4. Unable to Reproduce Cumulative Risk Estimates in Table 4-4

Table 4-4 identifies the cancer unit risk factors (URFs), annual average concentrations (AAC), and the cumulative risk estimates for a number of toxic air contaminants presumably based on multiplying the URFs and the AACs. When the URFs are multiplied by the AACs, the product is different than the cumulative risk value reported in the table. For example, the product of the reported AAC for diesel (9.166 $\mu g/m^3$) multiplied by its URF (300/million) is 2,750, not 681.62. Applying the same approach for benzene, but converting the AAC for benzene to $\mu g/m^3$ (1.029 ppb = 3.28 $\mu g/m^3$), the product is 95, not 43.46. The risk estimates were not reproducible based on the data in this table. The District should explain how the cumulative risk values in Table 4-4 were derived.

As previously stated, I appreciate this opportunity to provide input into revising the draft MATESIII report. I believe that this is an important exercise because accurate and understandable risk communication to stakeholders is essential for making informed decisions regarding public health in a functioning democracy.

Sincerely,

Michael D. Easter