APPENDIX XIV

MATES V

FINAL REPORT

Comments Received on MATES V Report

Comment Letter A from Delbert Eatough

To: Dr. Jo Kay Ghosh
Health Effect Officer
South Coast Air Quality Management District

Report on the MATES V Technical Advisory Croup Meeting
April 14, 2021

From: Dr. Delbert J. Eatough
Professor of Chemistry, Emeritus
Brigham Young University

Scope of Comments

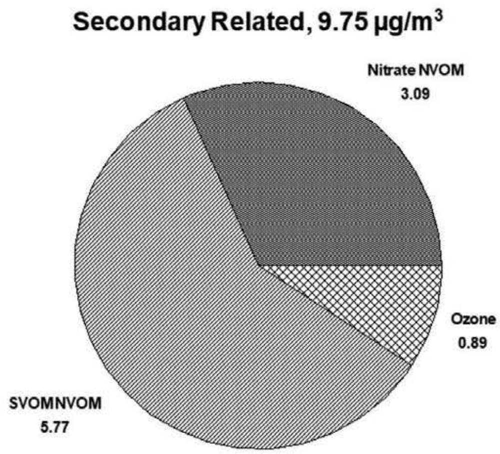
I appreciate the opportunity you gave me to participate as a Technical Advisor in the April 14 meeting. As I am a chemist and have no background in the health effect evaluation, which is the heart of MATES V, I will limit these comments to the areas where I have some expertise. MATES has consistently shown that the major contributor to cancer risk to inhabitants of the South Coast Air Basin is exposure to diesel PM because of the fine particulate black carbon present in these emissions. Over the years I have been involved in three studies in cooperation with the Sought Coast Air Quality Management District on the determination of the source of this diesel PM. The Results of these studies shed light on assumption made in the MATES health evaluations. I will briefly review the studies and results which I think are most pertinent to the topic of this report and have attached the publications resulting from those studies. I will then relate those results to the presentation made at the April 14 meeting.

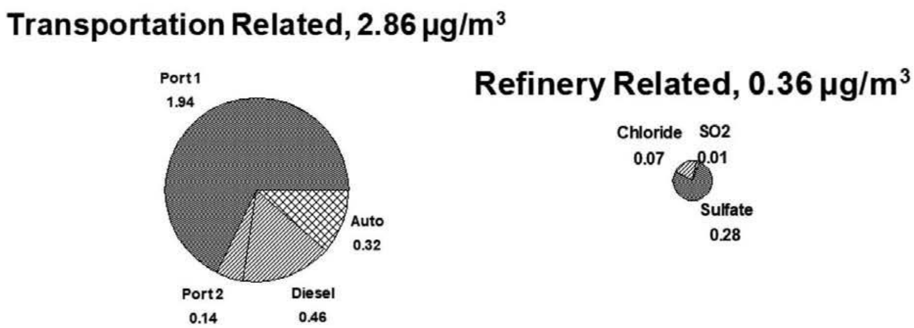
I would like to emphasize that each of these studies was a $PM_{2.5}$ source apportionment study based on hourly averaged data. The use of hourly averaged data allows the identification of sources of $PM_{2.5}$ based on diel changes in the presence of the species included in the analysis at the sampling site and allows details to be identified which are not identifiable from 24 hour every few days data sets. A-1

Apportionment of PM2.5 adjacent to the I-710 Harbor Freeway in Long Beach, CA (August – September 2012)

During August and September 2012, a study was conducted to determine the sources of $PM_{2.5}$ adjacent to the I-710 Long Beach Freeway. The site is directly affected by the emissions from heavy diesel traffic flowing from major container ports about 10 km south of the sampling site. The site is just south of the 2012 MATES Compton site. Hourly average data were obtained for particulate species including $PM_{2.5}$, black carbon and UV absorbing carbon, EC, fine particulate nonvolatile and semi-volatile organic material (NVOM and SVOM), sulfate, nitrate, chloride, ammonium ion, and Na ion, and for related factors including O_3, CO, NOX, SO_2, and total traffic flow on the I-710. A total of 520 hourly averaged data sets with 15 measured variables were analyzed by EPA-PMF v5.0. The key features of the results are shown in the following Figure from the publication.

Pie charts of the contribution of the three factors contributing to secondary related factors, the four factors contributing to transportation-related factors and the three factors contributing to the refinery-related factors to total $PM_{2.5}$. The area of each graph and pie section are related to the contribution of each to total $PM_{2.5}$.





A-1 cont.

As indicated in the above figure, Secondary Related $PM_{2.5}$ was responsible for 75% of the $PM_{2.5}$ and 3% was from Refinery Related emissions. The later came from upsets at a nearby refinery. The remainder, 22%, was from traffic related emissions.

The major objective of the study was to determine the impact of traffic from the ports at the monitoring site. Factors related to both diesel traffic originating from the ports and diesel traffic from non-port origins were identified. The diesel traffic originating from the ports was responsible for 9% of the total traffic and 95% of the BC measured at the sampling site. The non-port diesel traffic was responsible for 15% of the total traffic and 5% of the BC. While the Port 1 diesel traffic coming from the ports contributed a large fraction of the BC, this source contributed only 2% of the CO and 5% of the NO_X at the sampling site. The Port 2 sources was associated with traffic from the Ports which were high emitters of CO and NO_X. An important point in these results for the MATES program is that essentially all BC measured in the study was associated with diesel traffic emissions.

Source apportionment of 1 h semi-continuous data during the 2005 Study of Organic Aerosols in Riverside (SOAR) using positive matrix factorization (July-August, Riverside)

Positive matrix factorization (PMF2) was used to elucidate sources of fine particulate material ($PM_{2.5}$) for a study conducted during July and August 2005, in Riverside, CA. One-hour averaged semi-continuous measurements were made with a suite of instruments to provide $PM_{2.5}$ mass and chemical composition data. Total $PM_{2.5}$ mass concentrations (non-volatile plus semi-volatile) were measured with an R&P filter dynamic measurement system (FDMS TEOM) and a conventional TEOM monitor was used to measure non-volatile mass concentrations. $PM_{2.5}$ chemical species monitors included a dual-oven Sunset monitor to measure both non-volatile and semi-volatile carbonaceous material, an ion chromatographic-based monitor to measure sulfate and nitrate and an Anderson Aethalometer to measure black carbon (BC). Gas phase data including CO, NO_2, NO_X and O_3 were also collected during the sampling period. In addition, single-particle measurements were made using aerosol time-of-flight mass spectrometry (ATOFMS). A-1 cont.

All the data except for the ATOFMS and ToF-AMS data were used in an initial evaluation of sources at Riverside during the study. PMF2 was able to identify six factors from the data set corresponding to both primary and secondary sources, primarily from automobile emissions (0% if BC), diesel emissions (78% of BC), secondary nitrate formation (7% of BC), a secondary photochemical associated source (0% of BC), organic emissions (7% of BC) and Basin transported pollutants (8% of BC). Again, diesel emission account for the bulk of the BC.

Source Apportionment of One-Hour Semi-Continuous Data Using Positive Matrix Factorization with Total Mass (Nonvolatile plus Semi-Volatile) Measured by the R&P FDMS Monitor (July 2003, Rubidoux)

Semi-continuous monitoring data have been shown to greatly improve the power of receptor models to determine sources because the data include information on diurnal changes in the atmosphere. Such variation assist in the factor analysis identification of sources (or atmospheric processes) which vary diurnally. In this first study by us un the South Coast Air Basin, PMF2 was used to deduce source contributions from a sampling campaign conducted at the SCAQMD station in Rubidoux, CA during July 2003. Semi-continuous measurements (1-h average) were made using an FDMS TEOM (total fine particulate mass), a conventional TEOM (nonvolatile fine particulate mass), an R&P 5400 Carbon monitor (elemental and organic carbon), an Aethalometer (black carbon), and an R&P 8400N nitrate monitor. Hourly average CO, NO_x, and NO gas phase data were also available.

PMF2 analysis of the data yielded a six factor solution with sources attributed to automobile emissions (1.5 $\mu g/m^3$), diesel emissions (4.3 $\mu g/m^3$), secondary nitrate (17.0 $\mu g/m^3$), photochemistry (5.7 $\mu g/m^3$), organic aerosol (6.2 $\mu g/m^3$), primary emissions (2.8 $\mu g/m^3$). 94% of the EC was associated with the diesel emissions factor and 3% each with the secondary nitrate and primary emissions factors. A-1 cont.

The common thread through each of these studies is that the great bulk of BC associated with fine particles in the South Coast Air Basin are associated with diesel traffic emissions.

I would again emphasize that common factor in each of the studies reported is the use of a one-hour averaged data and the extensive characterization of the $PM_{2.5}$ composition and other factors which might contribute to the source characterization analysis. Not specifically highlighted in the discussion, but also evident in the analysis, was the importance of including highly time resolved measurements of the major $PM_{2.5}$ constituents. When data are available on a diel basis, factors can be identified which cannot be elucidated from 24-hour averaged data,

Comments on the MATES V Technical Report.

1. Black Carbon

The pertinent conclusion given in the previous section that is based on PMF analyses of hourly average data in three different studies in the South Coast Air Basin, black carbon in the Basin is essentially all from emissions from diesel traffic.

This conclusion is counter to assumptions which have been made through the past MATES program that the black carbon sources include On-road, Off-road, Point and Area sources with the emissions estimates being derived from:

On -Road. Emission were determined using factors deemed most current and vehicle emission data and vehicle activity data (Section 3.5). A-2

Off-Road. Emissions were determined using an update of the 2016 AQMP off-road emissions estimate (Section 3.6), If the conclusions drawn in the previous section are correct, these emissions should be small to negligible.

Point. These estimates were based on reported emissions data from facilities emitting four tons or more of VOC, NO_X, SO_X, or PM or emitting 100 tons or more or CO per year. The pertinent species here would be the emission of PM. Details are not given on the specific speciation profile for the PM. However, if the conclusions drawn in the previous section are correct, the black carbon in the emitted PM should be small to negligible.

Area. Since the area source estimates are based on the above outline emission types, again the conclusions based on results in the first section would be that are associate black carbon is small to negligible.

The actual distribution for sources of black carbon given in Table 3.4 of the MATES V report is

On-road	Off-road	Point	Area
25%	26%	6%	>1%

A-2 cont.

If the conclusions given in the previous section are correct, then the Off-road contribution to black carbon is way over estimated and assumptions will be made about future controls on potential Off-road sources which are not needed for black carbon control and the effort to improve diesel traffic emission might be somewhat reduced. In this connection, the I710 study outlined in the previous section looked specifically for evidence of black carbon at the sampling site from ships at sea or ships entering the harbor and could not find evidence for these two sources being important in that road-side study.

I suggest that SCAQMD consider modifying the MATES V report to reflect the probable overriding important of black carbon from diesel traffic on the overall cancer health impacts identified in the program.

2. Benzene

I have one observation in connection with possible sources of benzene. We recently conducted a source apportionment study in cooperation with the State of Utah Division of Air Quality on sources of dichloromethane at a sampling site in Bountiful, Utah, just north of several oil refineries. We identified the refineries as the probable primary source of the dichloromethane, with an important parameter in the PMF analysis being BTEX, the combination of benzene, toluene, ethylbenzene, and xylene.

Among chemical industries, petroleum refineries have been identified as large emitters of a wide variety of pollutants. Benzene, toluene, ethylbenzene, and xylene (BTEX) form an important group of aromatic volatile organic compounds (VOCs) emitted from petroleum refineries because of their role in the troposphere chemistry and the risk posed to human health. A-3

It would be expected that refineries in the South Coast Air Basin will emit this group of compounds. Toluene was a second compound in this group routinely measured in MATES. It might be worthwhile to look at the correlation between benzene and toluene to see if they are related at sites closer to refineries, such as the Compton site and to consider adding the other two members of this group to the next MATES effort. This may give clues as to the possible importance of benzene from petroleum refineries.

The commenter also submitted the following publications as part of the comment. Since these publications are copyrighted materials, these copyrighted materials are not reprinted here, and instead, we are providing a list of the publications received and links to websites where such materials may be available for viewing and download.

Grover BD and Eatough DJ. (2006). Source Apportionment of One-Hour Semi-Continuous Data Using Positive Matrix Factorization with Total Mass (Nonvolatile plus Semi-Volatile) Measured by the R&P FDMS Monitor. Aerosol Science and Technology, Volume 42, 2008 (1), 28-39. https://www.tandfonline.com/doi/full/10.1080/02786820701787910

Eatough DJ, Grover BD, Woolwind WR, Eatough NL, Long R, Farber R. (2008). Source apportionment of 1 h semi-continuous data during the 2005 Study of Organic Aerosols in Riverside (SOAR) using positive matrix factorization. Atmospheric Environment, Volume 42 (11), 2706-2719. https://www.sciencedirect.com/science/article/abs/pii/S1352231007006516

Eatough DJ, Cropper P, Keeton W, Burrell E, Hansen JC, Farber R. (2020). Apportionment of PM2.5 adjacent to the I-710 Harbor Freeway in Long Beach, CA. Journal of the Air & Waste Management Association, Volume 70, 2020 (3), 260-282. https://www.tandfonline.com/doi/full/10.1080/10962247.2019.1705436

Comment Letter B from Scott Fruin

Keck School of Medicine of USC

Scott Fruin
Assistant Professor

May 31, 2021

Jo Kay Ghosh, PhD, MPH
Health Effects Officer/Director of Community Air Programs
South Coast AQMD

Dear Dr. Ghosh,

Thank you for including me as a member of the Technical Advisory Group. The following are my comments and suggestions regarding the draft report of the MATES V results.

It is impressive that pollutant concentrations have once again shown such large and important decreases. The technical quality of the MATES V campaign and analysis is excellent, and this comes across well in the report. It is clear the modeling has made big strides, further improving agreement between measured and modeled pollutants as well as weather. Demonstrations of sampling day meteorological representativeness and comparability of meteorology between campaigns IV and V were also quite well done.

My suggestions are primarily where I think the results presentation and interpretation can be enhanced and where uncertainty can be better appreciated. A detailed list is given under "Specific Suggestions" below. However, there are some important suggestions for the Executive Summary that I think are worth emphasizing, as it is by far the most commonly read. These are as follows:

- The large risk reductions from MATES IV to V should be featured more prominently. B-1
- The risk of premature mortality from PM2.5 should be mentioned up front, to help put the cancer risks in context of overall air pollution health risk. B-2
- The new hazard index calculations need more interpretation, especially since they are well above thresholds of concern. B-3
- The uncertainty of diesel PM risk should have more detail (ditto for Chapters 1 and 2. See specific comments below). There are large uncertainties in the cancer potency factor multiplier and still relatively large uncertainties in the EC-to-DPM conversion, and this is important for the reader to appreciate. For example, the large drop in the EC-to-DPM conversion factors from MATES III to IV (shown in Table 0-4 in Chapter 1) may be contributing to the large drop in calculated cancer risk shown in Figure ES-3. (Concurrently, it can be pointed out that the decreases in actual concentrations such as EC2.5, for example, are less uncertain because they do not rely on any conversions or multipliers.) B-4
- The air basin maps should remove the density of port boundaries as this sometimes makes the ports appear to be an area of exceptionally high impact, such as Figure ES-6. (This occurs throughout the report.) B-5

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Keck School of Medicine of USC

Scott Fruin
Assistant Professor

More specific comments are listed below.

Please feel free to contact me if you would like any further information or clarification.

Sincerely,

Dr. Scott Fruin, P.E.
Environmental Health Sciences
Department of Preventative Medicine
USC Keck School of Medicine
University of Southern California, 2001 N Soto Street
Los Angeles, CA 90032

SPECIFIC COMMENTS

Executive Summary:

- Page 1, paragraph 2: Suggest pointing out "toxic air contaminants" are those pollutants without regulatory standards.
  Suggest including mention of premature mortality risk due to PM2.5 as an additional major health risk in the SoCAB.
- Page 5, paragraph 2: Define "non-inhalation pathways" (i.e., oral and dermal and what these entail). Briefly say how important they are such as adding 5 to 7% to overall cancer risk. Might add that they likely have higher uncertainty than inhalation risk estimates.
- Page 5: "Results" should be a major heading.
- Page 5, first paragraph in Results: suggest citing the risk numbers here and defining how calculated. Suggest separate paragraphs on current risks and trends. B-6
  Suggest defining "secondary formation."
- Page 8, paragraph 1: the introduction to hazard indices needs more explanation, such as why added, why important, how to interpret, etc.
  Some of these details here are rather obscure and belong deeper in the report.
- Page 8, figure ES-4. Font size is too small.
- Page 8, paragraph 2: Some guidance on interpretation of HIs belongs here. Also point out here that HI is calculated separately by organ.
- Figure ES-6: Port boundaries are dense and look like high risk since dark colors are highest risk. These should be removed. (This occurs throughout the report.)

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Scott Fruin
Assistant Professor

Page 11, first paragraph: the changes due to non-inhalation risk cancer additions are not important compared to the uncertainty in the cancer risk. These details probably do not belong in the ES or need to go in Table ES-2.
Page 12, Figure ES-7: Presenting risk reduction by % reduction may be more effective or it may be a good additional figure.
Page 12, Caveats, paragraph 2: the uncertainty around BC/DPM should be included when cancer risk is first presented.
Suggest including here that uncertainty is markedly reduced when comparing trends in actual concentrations, especially EC2.5, where the diesel PM conversion uncertainty and cancer potency uncertainty are yet to be added in.
An additional caveat is that the sampling and modeling design does not capture near-source exposures such as living near freeways.
"Conclusions" and "Policy Implications": some of these key highlights deserve to also be presented earlier in the Executive Summary. B-6 cont.

Chapter 1:

Page 6: suggest adding to "Dose Response Assessement" another paragraph giving more detail about uncertainties in the cancer potency factor for diesel PM, as this uncertainty likely dominates the total cancer risk uncertainty of the study.

Page 8, in "Source of Uncertainty": I suggest having a paragraph that explains how the changes in EC2.5 concentration reflect a less uncertain risk reduction estimate from diesel PM than estimates of diesel PM cancer risk (since it is a direct measure and not reliant on conversion factors or potency factors). A comparison table of EC2.5 versus diesel PM concentrations, measured and modeled, for MATES IV versus V would be a useful addition here. B-7

Chapter 2:

Figure 2-3 illustrates there is still likely high uncertainty in the early EC to DPM conversions where MATES II used a 1.95 factor (Table 0-4) while all factors in MATES IV and V ranged from 0.7 to 0.9. This "step change" from III to IV may exaggerate the diesel PM risk reduction from III to IV, as shown by comparing diesel PM results in Figure 2-3 to measured EC in Figure 2-4. This also affects graphs like 0-47 of total cancer risk trends and ES-3 in the Exec Summary. B-8

An uncertainty analysis based on the variability of these conversion factors might be a useful addition here.

Chapter 4:

Figures 4-18 to 4-21: recommend also including a horizontal line showing basin wide cancer risk level for MATES IV B-9

Appendices should have titles.

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Comment Letter C from Ken Davidson

From: Davidson, Ken
To: Jo Kay Ghosh
Subject: MATES V Comments
Date: Tuesday, June 1, 2021 4:32:24 PM

Hi Jo Kay,

My apologies for not getting these to you before COB yesterday. My comments are pretty minor and certainly not showstoppers. My main comment is, once again, great work on the study. Though burdened with some of the most challenging air quality issues in the country, the MATES analysis continues to be an amazing resource for the SCAB and for stakeholders both local and nationally. I especially appreciated the work to update the previous MATES data for consistency and comparability, as well as the addition of risks from multiple pathways. Here are my other comments:

- Suggest pulling some of the EJ results from Chapter 4 into the Executive Summary. C-1
- In the discussion of uncertainty in both the ES and Chapter 1, it might be good to acknowledge unquantified health risks from air toxics omitted from the analysis (both monitored and modeled). C-2
- Chapter 1 first paragraph: The sentence "Unlike the common 'criteria air pollutants,' there are not state or federal standards for air toxics." As written, this statement is actually false since both EPA and CARB develop standards for controlling air toxics from sources in an industry group (NESHAPs & ATCMs), though there aren't ambient standards for air toxics concentrations. C-3
- EPA has heard from different sources that there's a preference to move away from labeling communities "EJ communities." I wonder if you've heard the same. "Communities with EJ concerns" is one way to rephrase. Just a thought. C-4
- In Section 1.3, I think the only human activity pattern data I noted in the exposure and risk characterization was fraction of time spent at home. Is that correct? C-5

Again, great work. Thanks for the opportunity to review – I look forward to sharing these results with my colleagues in R9, OAQPS, and OTAQ. Best,

Ken

Comment Letter D from John Budroe

John Budroe – Comments on MATES V Report

Content Comments

2.9 Chronic Non-Cancer Risk Estimates
Chronic non-cancer risks are long-term non-cancer health impacts from exposure to toxic air contaminants that have a defined Reference Exposure Levels (REL). A REL is defined as the concentration at which no adverse non-cancer health effects are anticipated for one or more target organ systems (reference: OEHHA Hot Spots, section 8.3). Similar to cancer risks, risks from both inhalation and non-inhalation pathways were calculated and reported for this study.

A cancer inhalation unit risk (IUR) is used to calculate a cancer risk resulting from a specific carcinogen air concentration. In that case, the cancer IUR is calculated from the slope of a non-threshold dose-response for that carcinogen.

However, a comparison of an air toxic concentration to a chronic REL would generally not be used to derive a probabilistic noncancer risk estimate. Unlike cancer IUR derivations, chronic REL derivation methodology assumes the existence of a threshold for adverse health effects. Additionally, this methodology uses uncertainty factors (UFs) to extrapolate from chemical adverse health effect data to a chronic REL. The magnitude of these UFs differs between chronic RELs. An air toxic concentration that results in a Hazard Quotient (HQ) of two may not produce twice the risk of causing an adverse health effect compared to a concentration resulting in a HQ of one. The likelihood that a concentration of an air toxic will result in an adverse health effect does increase as the HQ increases, but that increase cannot be depended upon to display linearity. D-1

Section 8.3.1 (Calculation of Noncancer Inhalation Hazard Quotient and Hazard Index) of the 2015 Hot Spots Guidance Manual states: "An HQ of 1.0 or less indicates that adverse health effects are not expected to result from exposure to emissions of that substance. As the HQ increases above one, the probability of human health effects increases by an undefined amount. However, it should be noted that a HQ above one is not necessarily indicative of health impacts due to the application of uncertainty factors in deriving the RELs." It should be noted that this section of the Guidance Manual discusses "adverse health effects" and "health impacts", not risks.

It would be more accurate to say that HQs were calculated for air toxics which have existing chronic RELs, and the likelihood of experiencing an adverse health effect increases as the HQ increases.

These comments also generally apply to **Estimates of Chronic Non-Cancer Risk based on Monitoring Data,** starting on page 2-64.

Proofreading Comments

Executive Summary

Figures ES-6, 7 and 9 need to have the text at the bottom of the figure cleaned up. Also, ES-9 should be renumbered to ES-8. D-2

Chapter 1

Page 1-9: and Helsel (2012)[16] for handling this type of data (see Appendix XI for details). D-3

Chapter 2

Page 2-14: The revised methodology includes utilizing age sensitivity factors to weigh early life exposure, higher, as well as updated assumptions on breathing rates, and length of residential exposures.

Chronic non-cancer risks are long-term non-cancer health impacts from exposure to toxic air contaminants that have a defined Reference Exposure Levels (REL).

Page 2-16:

Diesel PM
Diesel Exhaust estimates are shown in Figure 2-3, and the continuation of a trend of decreasing diesel exhaust over time at all stations. D-4

This is a bit unclear – possibly what was meant was "and illustrate the continuation of a trend of decreasing diesel exhaust over time at all stations"?

Page 2-18: Delete benzene graph (redundant, shown on page 2-19).

Figure 2-5 and Figure 2-46 present levels for benzene and 1,3-butadiene, which are emitted

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Page 2-30: Figure 2-18. 2-19. Average Concentrations of Bromomethane – upon examination, it became apparent that the two graphs were showing the same data set, with different y-axis scales between the two figures. However, it would make it easier for the reader if the difference between the two figures was explicitly described in the text and/or the figure legend. This comment holds for all chemicals in the report where the same data set was displayed in two figures with different y-axis scales.

Comment Letter E from Janet Whittick

California Council for Environmental and Economic Balance
101 Mission Street, Suite 1440, San Francisco, California 94105
415-512-7890 phone, 415-512-7897 fax, www.cceeb.org

June 7, 2021

Dr. Jo Kay Ghosh
Health Effects Officer and Director of Community Air Programs
South Coast Air Quality Management District
Submitted Electronically to jghosh@aqmd.gov

RE: MATES V Draft Report

Dear Dr. Ghosh,

On behalf of the California Council for Environmental and Economic Balance (CCEEB), we appreciate the opportunity to comment on the fifth and most recent iteration of the Multiple Air Toxics Exposure Study (MATES V) and accompanying draft report. CCEEB has been an active stakeholder at the South Coast Air Quality Management District (SCAQMD) for many years, and has seen the progress made by the District and its partners since the first MATES was conducted in 1986. We believe MATES V is a major achievement, both in terms of the technical and scientific rigor of monitoring and modeling by District staff, but also, most importantly, the significant reductions in toxic emissions and exposures that have occurred throughout the air basin. The draft MATES V report shows a 54 percent reduction in cancer risk since MATES IV in 2012, along with decreases in on-road, off-road, and point source carcinogenic emissions of 59 percent, 39 percent, and 49 percent, respectively, over the same time period.

Use MATES V to Help Inform AB 617 and Other Community-based Actions

CCEEB believes MATES V marks an important milestone in the District's clean air and public health history; while a 454-in-a-million cancer risk is still unacceptably high, it is roughly half the risk from MATES IV in 2012, and 82 percent lower than MATES II in 1998. Alongside these critical risk reductions, MATES V shows similar rates of reduction in diesel particulate matter (DPM) emissions. Over the same period and, in part, as a result of outreach and community discussions stemming from MATES, the District's understanding of localized impacts and environmental injustices has grown. CCEEB appreciates the analysis shown in Chapter 4 that quantifies benefits in SB 535 and AB 617 communities, and believes that data and lessons from MATES V can and should augment the District's community-specific investigations and engagement. Particularly for AB 617, understanding the drivers of risk can help communities formulate targeted actions that achieve even greater reductions. MATES V also helps us understand what areas – both in terms of geography and sources – call for more attention, and suggests which programs and policies have contributed most to success. E-1

Include an Abbreviated Discussion of "Estimates of Risk" in the Executive Summary

CCEEB also appreciates the discussion of risk assessment and risk characterization in Chapter 1.3. We ask staff to include a shortened version in the Executive Summary to help provide context and meaning for risk estimates. In particular, the section explaining potential cancer risk on page 1-7 and the following section on "Perspectives of Risk" could be adapted to simply explain how to interpret cancer risk estimates like 454-in-a-million or 1,141-in-a-million. E-2

Project Anticipated Further Reductions in DPM for 2023 and 2030

While the release of the draft MATES V report is timely and important, it is also somewhat limited and already outdated as it only depicts data from 2018. Significant reductions in air toxics, in particular DPM, have occurred since then. For example, a review of EMFAC2017 indicates that DPM emissions are expected to decrease by 79 percent between 2018 and 2023. Since the District and its agency and public partners are updating future year emissions inventories as part of the 2022 Air Quality Management Plan (AQMP), and since cancer risks associated with DPM are based on emission inventories and modeling rather than on measured concentrations, we ask staff to include in MATES V projected DPM cancer risk for 2023 and 2030, and include this information in the final report. If the District is unable to analyze and show these future year DPM reductions in cancer risk, then we ask that the following statements, or something similar, be added to the final report.

> Page ES-5.
> "…and 86% lower since MATES II based on monitored data. In addition, an analysis of EMFAC2017 indicates that DPM emissions are projected to be reduced by an additional 79% between 2018 and 2023. These reductions reflect ongoing efforts to further reduce DPM from rules already adopted by the District, the state air board, and the federal Environmental Protection Agency" E-3
>
> Page 2-60
> "… approximately 50% of the cancer risk, see Figure 0-49. While future year cancer risks from DPM were not included in this report, we expect that cancer risk associated with DPM will continue to decrease since, based on an analysis of EMFAC2017, DPM emissions are projected to be reduced by an additional 79% between 2018 and 2023. These reductions reflect ongoing efforts to further reduce DPM from rules already adopted by the District, the state air board, and the federal Environmental Protection Agency"
>
> Page 3-9
> Please insert the following after Table 3-4
> "An analysis of EMFAC2017 indicates that DPM emissions are projected to be reduced by an additional 79% between 2018 and 2023. These reductions reflect ongoing efforts to further reduce DPM from rules already adopted by the District, the state air board, and the federal Environmental Protection Agency"

> Page 4-6
> "… impacting in various categories of on-road and other mobile sources. And these diesel concentrations are expected to decrease an additional 79% between 2018 and 2023, based on an analysis of EMFAC2017. These reductions reflect ongoing efforts to further reduce DPM from rules already adopted by the District, the state air board, and the federal Environmental Protection Agency"

E-3 cont.

In addition, in the interest of clarity, we ask that the figures in the final MATES V report clearly identify in the title whether the information shown is population weighted or not.

Transparency in data is the cornerstone of sound science, which in turn supports effective and actionable public policies and air quality rules. CCEEB commends the SCAQMD for its work on MATES V, and thanks staff for its efforts and ongoing commitment to this important effort.

Sincerely,

Janet Whittick
CCEEB Vice President and South Coast Air Project Manager

cc: Mr. Bill Quinn, CCEEB president
Members of the CCEEB South Coast Air Project

Additional Comment Letters Received After the Comment Deadline

Comment Letter from Michael Benjamin

Summary of CARB's comments on SCAQMD's MATES V

Thanks for sharing the links to the updated MATES work also providing time to provide feedback. Below are comments from the California Air Resources Board staff. Please feel free to reach out to us to have further discussion on the points below.

Consideration of New and Emerging Chemicals and Noncancer Impacts: CARB staff appreciate the updated toxics and monitoring data for the top TACs. However, in future studies, it will be important to include new and emerging chemicals (e.g., PFAS, etc.), additional health analysis and quantification of PM mortality as well as other noncancer impacts like hospital visits, cardiovascular, asthma, etc. SCAQMD should consider assessing acute REL's (max hourly concentrations) in future MATES studies.

Adding Community Monitors: The current MATES structure is able to capture pollutant levels at the regional scale, but not community. Given the focus of AB 617, consider adding a few community-specific monitors to check on the progress within these communities.

Outlining the Process for Handling High Risk: We recommend having some statements throughout the document that discuss how SCAQMD handles situations where certain emission levels result in elevated. For example, if there is elevated risk due to methyl bromide emissions due to fumigation operations.

Focus on Stationary Sources: As the particulate matter concentrations continue to decline, it will be important to understand the breadth of emissions (particularly from new and emerging chemicals) from stationary sources and their impact on this modeling effort. Particularly important at the localized level, it is also important to evaluate the impacts from stationary sources that may be near road ways or clustered together near local receptors.

Air Toxics Monitoring Comments and Recommendations: These comments are grouped into 3 general categories and designed to address the current document but also future considerations:

1) What thoughts or concerns do you have in terms of monitoring for toxics (e.g., new approaches to monitoring, use of new technologies, limitations of current techniques, sampling frequencies and locations, could a MATES type program be deployed statewide, etc.)?

- In the Mates V draft section 2.7, *Sampling Issues*, SCAQMD discussed a problem with their carbonyl sampler and VOC canister. In general, the district invalidated data from those instruments due to leaks in connections. The leak involved 3 of their 10 monitoring stations, but still a good amount of data was invalidated. This underscores the importance of regular functional checks for instruments. This will avoid the unnecessary invalidation of data, which may diminish the study's purpose and informational returns. Fortunately, SCAQMD has taken steps to prevent similar occurrences in the future.

- The reference to a 2000 CARB citation/webpage on limitations for acrolein measurements from stationary sources is confusing. There are certainly more recent efforts to acknowledge limitations of traditional analytical approaches, as well as offer alternative approaches. Given the emerging interest in acrolein, it is recommended that a parallel comparison be made with butadiene. Does methacrolein present the same health effects concerns as acrolein? If so, are those relevant to comparisons of risk from butadiene and those of isoprene?
- At some point more intensive monitoring of POPs (e.g. PFAS, PFOS, PCBs, PBDEs, Dioxins, etc.) are likely going to be needed from the extraction and analysis of PM as we continue to drive down the main volatile/semi-volatile 'bad actors' for air pollution health risks. Spatial variability for these types of compounds will be a challenge both from an exposure assessment perspective, but also from assessing regulatory phase-out effectiveness. They may be best assessed via biomarkers related to environmental exposures.
- There are several references to advanced monitoring techniques that will be discussed in a separate report. It would be interesting to know if SCAQMD investigated using continuous GC measurements for hourly VOC concentrations to assess temporal trends in toxicity? For example, a thermal desorption pre-concentration unit coupled to a GC-MS system. The USEPA has a method using a system of this manner for fugitive and area source emissions (Method 325B). The inclusion of high-temporal resolution measurements – even if the number of compounds does not change – using a thermal desorption system in line with a GC-MS would provide useful insights to exposure pathways in heavily impacted areas.

2) What thoughts or concerns do you have in terms of laboratory operations or impacts (e.g., analytical methods, method development, detection limits, sampling media, etc.)?

- MDL and how to handle data below MDL are critical in assessing overall toxics exposure. The approach used in MATES V is reasonable (Kaplan-Meier nonparametric method combined with bootstrapping). When more than 80% of data are below MDL, substituting such data with zero values to get a lower bound and substituting with MDL to get an upper bound is an improvement over previous practice of simply substituting with half times the MDL for data below MDL. However, the report did not discuss consideration of other resampling techniques such as the jackknife instead of "bootstrapping" since bootstrapping essentially is resampling with replacement, which could lead to the same values being sampled repeatedly. It would be nice to have some sensitivity analysis done to justify the method chosen.
- In Appendix XI (Monitoring Data Treatment Methodologies), it was stated that Helsel (2012) refers to three approaches for handling data with non-detects: MLE, nonparametric with a single MDL, and nonparametric survival analysis. It was justified that the underlying assumptions for MLE were not sound, so nonparametric survival analysis was chosen (page Appendix XI-3); however, it was not clear how the second approach, nonparametric with a single MDL, was dropped.

- Data completeness requirements are said to be included in the monitoring QAPPs. For greater transparency, we would suggest showing the total number of samples and overall data completeness for each of the species and methods sampled as a supporting figure. This would apply both to South Coast in this report as well as any future toxics based report CARB may lead.
- There is a definite emerging need for more reliable methods to accurately quantify acrolein. A sensitive real-time method overcomes many of the existing limitations, but it comes with a hefty price or more intensive sampling/analytical approaches.
- Need to better quantify the uncertainties associated with different methods used to estimate diesel PM. Are we biasing the current surrogate methodologies based on correlations to attributes relevant to on-road emissions, if off-road emissions are substantially different from the on-road profiles and the regulatory cycles grow farther apart?

3) What thoughts or concerns do you have in terms of data management/validation (e.g., quality assurance/quality control, data storage, data messaging)?

- One suggestion is to include the process on how data was collected from instruments (i.e., a data logger, commercial software application, manually, etc., and how they stored it for later analysis (in-house database, commercial vendor, spread sheets, etc.)). Setting up instruments in a station is one hurdle and collecting the data from instruments is another. For instance, getting instrument data to a network or connecting an air monitoring station to the internet "in the middle of nowhere" is not a trivial task.
- In Chapter 2 regarding manifold leakage issue, which was also mentioned above, it is not clear how the data before 5/1/2018 was verified. If a leak check was performed that day, it should be stated in the document. It would also be helpful to mention what might cause the leakage at three locations at the same time (i.e., operation error, calibration, etc.).

Acetaldehyde and Formaldehyde: The increase of formaldehyde and acetaldehyde is interesting (CARB's iADAM statewide data also shows an increase in the formaldehyde concentration). Emissions from combustion sources are clearly decreasing as evident from the decrease in aromatics and PAHs emissions. Are there any indications from ambient data that secondary formation is somehow enhanced over the last few years (i.e., photochemical reaction pathways have shifted to form more aldehydes due to the reduction of NOx in air, or climate change has contributed to enhanced photochemistry due to high average temp)? It would be beneficial to state in Chapter 2 (2-22) whether there is any seasonal difference in the rate of increase (summer vs. winter) or if there is any spatial difference. Has the use of any consumer products that release aldehydes increased over the last several years?

Black Carbon, Elemental Carbon, Diesel PM:

Diesel exhaust vs Diesel PM: Throughout the document there are numerous references to diesel exhaust (Table 0-4 in Chapter 2) and diesel PM (Figures 0-44-0-47, Chapter 2), are these two considered to be the same? For example, does the diesel exhaust include gaseous or semi-volatile species as well as PM? If so, how were these chemicals separated in the health risk or monitoring?

Black Carbon vs Elemental Carbon: EC and BC is measured at all of the 10 fixed sites as part of MATES V monitoring. EC is stated to be used in the diesel exhaust/PM calculation, but there is not a discussion of the relationship between EC and BC at the same stationary site. A comparison between the two measurement techniques at the same site may provide insight into using BC measurements, rather than EC, in future toxics analysis.

Elemental Carbon to Diesel PM Ratio, Chapter 2, page 2- 9: The method in which the modeled EC:DieselPM is unclear. How is the modeled EC:DieselPM calculated at each site? Specifically, the methods to calculate the individual modeled EC and modeled diesel PM values to calculate the ratios in Table 0-4.

Edits and Clarifications: Below are minor edits and clarifications needed to improve the clarity of the document:

Overall:
in the text discussion, Roman numerals are used to differentiate MATES I, II, III, IV and V; however, in graphics, the numbers 1, 2, 3, 4, and 5 are used. There should be some consistency with the use of numerals or a statement correlating the uses. Also, page 2-13, Table 0-4 should be corrected to be 2-4; page 2-48 and subsequent pages, Figures 0-36 through 0-55 should be corrected to be Figures 2-36 through 2-55.

Executive Summary
Page ES-3: “cancer risks in *tall* these...”: Typo, should read “all”

Page ES-5: “CEQA”: Acronym introduced without description

Page ES-6: Figure ES-2: Odd pie-chart drawing I was unable to understand

For clarity, the data labels above the columns illustrating the risk trends in Figures ES-3 and ES-5 should use Roman numerals II to V (instead of Arabic numbers 2 to 5) to be consistent with the designations of the MATES studies they represent.

The discussion preceding Table ES-2 cites numbers that are slightly inconsistent with those presented in the table. Specifically, the discussion cites a 51% reduction in population weighted risk in the basin and 33% reduction in the Coachella Valley, but the table shows reductions of 54% and 30% (respectively) for multi-pathway exposure assessments, and 53% and 30% (respectively) for inhalation pathway only.

Chapter 1
Page 1-7: “Risk Management Policy (RMP) *Using* the Derived...”: typo, should be “using”

Page 1-7: “e.g. experiences of racism”: Sensitive wording, should probably be put in another form to reflect the intended meaning

Page 1-9: “state-of-the-science": Unusual/uncommon word, per online Google/dictionary search; could be replaced with "state-of-the-art" (catch-all term) Recommend checking throughout report.

Chapter 2
Inconsistent labeling of Tables and Figures. The tables in Chapter 2 are all labeled with a “0” prefix preceding the table number (e.g., “Table 0-1”), but the text referencing those tables uses a combination of “0” and “2” prefixes when citing them (e.g. “Table 2-1”). Similarly, a number of the figures in the chapter use the prefix “0”, but other figures use the prefix “2”.

Figures 0-47 and 0-48: the data labels above the columns illustrating the risk trends should use roman numerals II to V (instead of Arabic numbers 2 to 5) to be consistent with the designations of the MATES studies they represent.

Page 2-7, section 2.3: “for real-time measurements of *BC* was...”: Acronym meaning should be introduced in context here, instead of afterwards

Page 2-7, section 2.3: “DPM”: Acronym not explained
“black carbon”: For consistency, Black Carbon should be stated either capitalized, or not, throughout the entire report

Chapter 3
The discussion preceding Table 3-5 (p. 3-9) should introduce the concept of DPM equivalent emissions, since the term is used later in the same section when discussing increases in the DPM equivalent emissions of vinyl chloride, cadmium and methylene chloride.

Chapter 4
Page 4-18, Table 4-6: Risk Factor (µg/m3)-1: ambiguous measuring unit expression (due to incorrect text formatting?)

Comment Letter from Dennis Fitz

From: Dennis Fitz
To: Jo Kay Ghosh
Subject: Section 2 Comments on Draft Report Section 2Structure
Date: Wednesday, June 16, 2021 9:08:29 PM

Hi Jo:

I know it's way past the deadline for comments, but I finally sat down to read section 2 carefully. There are some problems in the structure that reflect compilation errors. Maybe they have been corrected in later versions, but certainly should be in the final document. Here are the most noticeable:

Tables are labeled 0-1 to 0-4. There are two Tables 0-4 and one should be Table 5. This looks like a cut and paste that wasn't corrected. Shouldn't these be Tables 2-1 thru 2-5?
Figure 2-4: Where are the results for MATES III and V?
Page 2-18: This is a cut and paste mess. The first Figure (Benzene) does not have a caption and is actually a duplicate of Figure 2-5 that comes later. It should be removed. The paragraph starts with "Figure 2-5and Figure 2-4" but should start with "Figure 2-5 and Figure 2-6". Toluene data are presented in Figure 2-7 and not 2-5 as stated in the text.
Pages 2-30 and 2-31: Figures 2-17 and 2-18 both show Bromomethane data, which is correct? No mention of Figure 2-18 in the text.
Figure 2-25 & 2-26; 2-27 & 2-28: 2-30 & 2-31: For clarification, it would help to mention in the text that the second figure of each set is at higher resolution.
Naphthalene and other PAH compounds (and following sections): The figures are labelled as 0-XX when they should be 2-XX.

I hope this helps make for a better document. I look forward to our meeting.
Dennis