FINAL REPORT

Multiple Air Toxics Exposure Study in the South Coast Air Basin

MATES-III

September 2008

South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765
Cleaning the air that we breathe...™

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CHAPTER 6

FINDINGS AND DISCUSSION

Chapter 6. Findings and Discussion

The MATES III Study incorporates several updates and improved methodologies compared to previous air toxics studies in the Basin to measure and model ambient levels of air toxics and their associated risks. Key elements and findings are listed below.

6.1. Improvements to Ambient Monitoring

- Samples were taken at ten fixed sites, once every three days. This compares to once every six days in previous studies.
- Sampling occurred for two full years at eight sites, and one full year at all ten sites.
- An updated method was used to estimate the contribution of diesel exhaust to ambient particulates.

6.2. Improvements to Air Toxics Modeling

- An updated modeling platform, CAMx, was used to model levels of air toxics throughout the Basin using the 2005 emissions inventory. This is the same model as used in the 2007 Air Quality Management Plan (AQMP).
- An updated meteorology model for the year 2005 was used.
- Updated emissions inventories based on the 2007 AQMP were used.
- An improved assignment of on-road truck emissions using the Caltrans/SCAG Truck Model was used.
- The CAMx platform was also applied to the MATES II time frame, using a back-cast of the MATES III air toxics emissions inventory to give more of an "apples to apples" comparison of modeled air toxics risks.

6.3. Key Findings

- During the study period, the overall Basin cancer risk from air toxics based on the annual average levels calculated from the ten monitoring sites data was approximately 1,200 per million.
- Diesel exhaust was the key driver for air toxics risk, accounting for over 80% of the total air toxics risk.
- Of the pollutants measured, only formaldehyde was above the current chronic exposure levels developed by OEHHA. However, OEHHA has proposed revised limits. If the proposed limits are approved, all average levels of air toxics would be below established Reference Exposure Levels.
- Ambient levels of most substances measured were lower over the period of the MATES III Study compared to that of the MATES II Study, which was conducted in 1998-99, reflecting the success of various control strategies to reduce exposure to air toxics.
- Benzene and 1,3-butadiene average levels, pollutants mainly from vehicles, were down

50% and 73% , respectively.

- Stationary source-related pollutants, such as methylene chloride (a solvent used in paint remover) and perchloroethylene (an industrial solvent used in dry cleaning) also showed declines of 53% and 78%, respectively.
- Levels of elemental carbon in the PM_{10} particulate fraction were about 38% lower than those found in MATES II. About a 10% reduction was traced to a difference in analytical instrumentation used in MATES III. The net 28% reduction in ambient levels may reflect decreased emissions combined with annual meteorological differences.
- Estimated air toxics cancer risks for the second year of the study were somewhat higher than the first year. It should be noted that the first year of the study had higher rainfall than the second year, which is expected to affect particulate measurements. This mainly reflects a higher estimate for diesel particulate levels in the second year.
- The Rubidoux station showed higher levels of hexavalent chromium in the ambient measurements compared to MATES II, and higher levels than found at the other monitoring locations. Additional follow up studies by District staff identified a nearby cement facility as the source. A report on the additional intensive monitoring results can be found on the District's web site at http://www.aqmd.gov/RiversideCement/RiversideCement.html.
- Modeling analysis shows the highest risks from air toxics surrounding the port areas, with the highest grid cell risk about 3,700 per million, followed by the area south of Central Los Angeles where there is a major transportation corridor, with grid cell modeled risks ranging from about 1,400 to 1,900 per million.
- Modeling analysis also showed pronounced exposures along freeways and near intermodal facilities.
- While the model estimates of air toxics risk showed an overall Basin-wide reduction, some areas showed an increase in air toxics risk. This was shown to be the case near the ports, in the eastern portions of the Basin and in northern Los Angeles County.
- Most of the monitored pollutants at the microscale sites did not show increased levels compared to the nearest fixed sites. The exception was the Santa Ana microscale site, which showed elevations of several pollutants related to vehicle emissions.
- Risk estimates in this study do not include mortality from particulate exposure. This was done in the 2007 AQMP.

6.4. Discussion and Policy Implications

- Although there are uncertainties in the ambient estimates, diesel particulate continues to be the dominant toxic air pollutant based on cancer risk. This finding holds up regardless of methodology used. The study findings therefore clearly call for a step-up in reducing diesel emissions as early as practicable and as aggressively as feasible.
- Goods movement is a significant source of diesel emissions. With the projected future growth in goods movement, diesel emissions may increase. The interplay between (a) the increase in goods movement and (b) projected emission reduction strategies will be

crucial in determining whether diesel exposures are reduced in the future.

- There are several uncertainties in estimating air toxics risks. These include uncertainties in the cancer potencies of the substances, in the estimates of population exposure, and uncertainty in estimating the level of diesel particulate.
- There is at present no direct measurement method for ambient levels of diesel particulate. For this study, staff used the Chemical Mass Balance (CMB) approach to estimate diesel particulate levels. The CMB method is considered to be the best available method based on current scientific knowledge and was recommended by the Technical Advisory Group as well. Using the CMB model takes advantage of the specific profile of chemical species in different emissions sources and results in a more robust statistical correlation of source contributions to ambient particulate matter levels.
- The CMB method gave higher estimates of diesel particulate than did the method used in MATES II. Thus, the methods used in MATES II may have underestimated risk from diesel particulate.
- Since diesel emissions will likely continue to be the dominant source of cancer risk from air toxics for the future, improvement in the methodology to estimate ambient levels of diesel particulates would help reduce uncertainty in risk estimates and better characterize future changes in risk.
- Since the timeframe of the MATES III study, there have been numerous regulations and initiatives to reduce diesel exhaust emissions by national, state, and regional authorities. Staff expects that any future air toxics study will be able to assess the effectiveness of these endeavors.
- Although the estimated Basin-wide risks declined from the MATES II period, areas near the ports, and inland in the eastern and northern portions of the District, actually showed increases in estimated air toxics risk. These are likely due to increases in emissions related to the additional cargo container traffic and goods movement that occurred between MATES II and MATES III time periods.