Multiple Air Toxics Exposure Study IV (MATES IV)

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Cleaning the Air That We Breathe…
MATES PROGRAM

• Periodic air toxics monitoring and evaluation study conducted in the South Coast Air Basin

• Three previous MATES studies:
  • MATES I (1987)
  • MATES II (1998-99)
  • MATES III (2004-2006)

• It includes:
  • A monitoring program
  • An emissions inventory of toxic air contaminants
  • A modeling effort to characterize risk across the Basin

• Focuses primarily on the carcinogenic risk from exposure to air toxics
MATES PROGRAM

• MATES I (1987)
  • Limited measurements; benzene and Cr\textsuperscript{6+} impacts

• MATES II (1998-99)
  • Downward trend for certain air toxics
  • Diesel Exhaust - 71% of cancer risks from air toxics

• MATES III (2004-2006)
  • Continuing downward trend other than Diesel PM
  • Higher Diesel PM risk near ports
  • Enhanced Diesel PM quantification methods
  • Observed increased Cr\textsuperscript{6+} - traced to emissions from cement plants
MATES III Main Results

- General downward trend for air toxics
- Estimated Basin-wide lifetime risk 1,200/million
- Mobile source toxics account for 94% of risk
- Diesel accounts for 84% of air toxics risk
- Non-diesel risk lower by 50% from MATES II

**MATES III Air Toxics Risk**
- Diesel PM: 83.6%
- Benzene: 5.7%
- 1,3 Butadiene: 4.5%
- Carbonyls: 3.3%
- Other: 2.9%

Basinwide Risk: 1194 per million
Based on Average at Fixed Monitoring sites
MATES III Main Results
Model Estimated Risk From All Emission Sources
EC Trends

- CA Construction GDP
- Long Beach
- Anaheim
- Fontana
- Rubidoux

MATES III
MATES IV Overview

**GOALS**
- Assess air toxics levels
- Update risk characterization
- Add ultrafine PM monitoring
- Add continuous black carbon monitoring
- Determine local mobile source impacts at selected locations

**COMPONENTS**
- Technical advisory group
- Long- and short-term ambient measurements
- Emission inventory update
- Regional modeling
- Risk characterization
MATES IV: Long-term Monitoring

- Continuation of MATES III methods for trend analysis
  - Measured species: VOCs, Carbonyls, TSP metals, Cr$^{6+}$, Lead, PM$_{2.5}$ speciation (metals, EC, OC), BC, UFP
  - 10 sites, 1-in-6 day, 24-hr integrated sampling, continuous monitoring (BC, UFP)
  - Utilize ongoing toxics monitoring programs
  - Duration: 07/01/2012 – 07/01/2013
MATES IV: Short-term Local-scale Monitoring

- Mobile source impacts: Ultrafine & Diesel PM
- Mobile monitoring platforms and multiple fixed sites to measure micro-scale gradients
- Short-term deployment (e.g. days to weeks)
- Locations (6-8 total)
  - Freeways (e.g. I-710, CA-110, CA-103)
  - Intersections/Warehouses (e.g. Mira Loma)
  - Rail yards (e.g. ICTF, San Bernardino)
  - Airports (e.g. LAX and Long Beach)
  - Communities (e.g. Boyle Heights)
Pre-MATES IV Instrument Evaluation
(Black Carbon and UFP)

Hourly average Black Carbon concentration: SCAQMD 710-fwy site

BC, ng/m³

60,000 to 95,000#/cm³

~8000#/cm³

~25,000#/cm³

60,000 to 95,000#/cm³
MATES IV: Preliminary Results

PM$_{2.5}$ mass (Q3Q4 data)

- Mirrors reductions seen in PM2.5 network samplers
MATES IV: Preliminary Results

PM$_{2.5}$ Elemental Carbon (Q3Q4 data)

- Indicator of diesel PM
- Significantly lower levels observed
PM$_{2.5}$ Vanadium (Q3Q4 data)

- Indicator of ocean going vessel (OGV) direct PM emissions
- Low-sulfur OGV fuel regulation – 24 miles from coast
MATES IV: Preliminary Results

Benzene (Q3 data)

• Mostly from gasoline vehicles
MATES IV: Preliminary Results

Perc (Q3 data)

- Continuing phase out of perchloroethylene use by dry cleaners (Rule 1421)
Benefits of the MATES Program

• **Risk Assessment:** identify the air contaminants (and their sources) responsible for most of the air toxics risk in the SCAB

• **Discovery:** unexpected results leading to previously unknown local sources of air toxics

• **Program Evaluation:** tracking the effects of regulations and programs designed to reduce the atmospheric concentration of diesel PM and other air toxic pollutants

• **Education and Outreach:** public awareness regarding exposure to toxic air contaminants and ways to minimize exposure