# 2. Brake and Tire Wear Exposure Concentrations in the South Coast Air Basin and Coachella Valley

South Coast AQMD RFP P2024-09

Bidders Conference #1, March 8, 2024

Bidders Conference #2, March 13, 2024


Nico Schulte, Ph.D.
Air Quality Specialist Planning, Rule Development, and Implementation

Mohammad Sowlat, Ph.D.
Program Supervisor
Monitoring and Analysis

Scott A. Epstein, Ph.D.
Planning and Rules Manager
Planning, Rule Development, and Implementation

Sang-Mi Lee, Ph.D.
Planning and Rules Manager
Planning, Rule Development, and Implementation

# Outline

- Objective of the work
- Tasks
- Monitoring capabilities
- Modeling capabilities
- Proposal submission procedures
- Discussion

# Objective of the work

- Estimate brake wear particle (BWP) and tire and road wear particle (TRWP) exposure concentrations throughout South Coast Air Basin and Coachella Valley
- South Coast AQMD staff will use the exposure estimates to estimate health risks associated with BWP and TRWP
- Monitoring, modeling, and analysis for the proposed work will be performed in coordination with the Multiple Air Toxics Exposure 6 (MATES VI) study

# Task Timeline

| | Due after contract signing* | Task |
|---|---|---|
| Task 1 | Two months | Present the technical proposal's study design to the MATES VI Technical Advisory Group |
| Task 2 | Six months | Literature review to identify pollutants in BWP and TRWP |
| Task 3 | Six months | Develop method to estimate exposures to BWP and TRWP |
| Task 4 | 30 months | Conduct measurement, modeling, and analysis, and estimate BWP and TRWP exposure for MATES VI |
| Task 5 | 39 months | Transfer data and prepare draft final report |
| Task 6 | 42 months | Presentation, technical report, and study publication |

*Anticipated contract execution August 16, 2024

# Task Details

- Must quantify directly emitted and resuspended (or the combination) PM10 BWP and TRWP mass concentrations due to emissions from on-road vehicles and roads
- Must separate BWP and TRWP from on-road vehicles and roads from those emitted by other sources
- Should at a minimum quantify substances identified in the literature review that have associated OEHHA cancer potency factors or reference exposure levels
- Should not rely only on model calculations since emission estimates may have large uncertainties

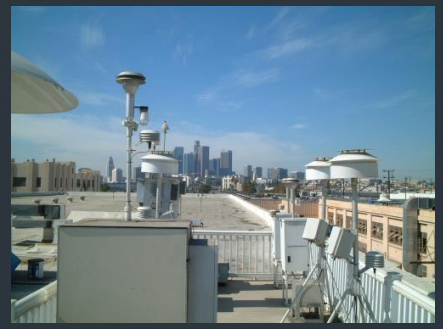
# Task Details (continued)

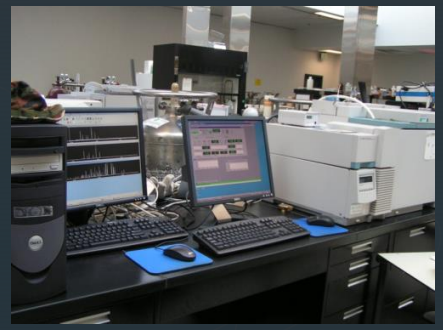
- Exposure estimate must have spatial resolution of 2 km or finer (anticipate that both measurements and modeling are required)
- It is desirable for contractor to use modeling system similar to the one South Coast AQMD staff will use for MATES VI or for the contractor to collaborate with South Coast AQMD staff to conduct some of the modeling-related activities
- Contractor should provide BWP and TRWP emissions and input data such that South Coast AQMD staff can use it independently
- Emissions and other needed input data should be ready to use in the South Coast AQMD's modeling platform

# MATES VI
# Monitoring Capabilities

# Time-Integrated Particulate Measurements

| PM Fraction | # of Sites | Analysis | Sampling Equipment | Analytical Method |
|---|---|---|---|---|
| PM2.5 | 6 | Metals | Met One SASS | ED-XRF |
| | | EC/OC | | Thermal-optical |
| | | Ions | | IC |
| | | Mass | | Microbalance |
| PM10 | 10 | Metals | SSI Hi-Vol | ICP-MS |
| | | EC/OC | | Thermal-optical |
| | | Ions | | IC |
| | | Levoglucosan | | GC-MS |
| | | Mass | | Balance |
| TSP | 2 | Metals | SSI Hi-Vol | ICP-MS |
| | | $Cr^{+6}$ | XonTech 924 | IC |

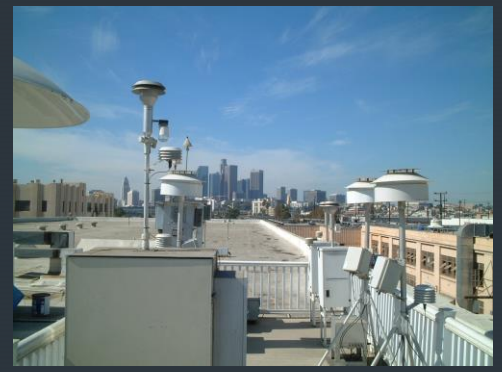


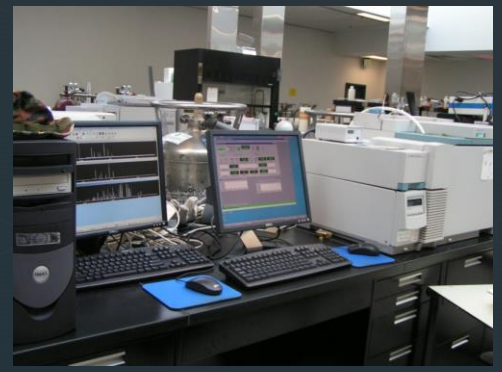


# Time-Integrated Gaseous Measurements

All 10 sites

| Pollutant | Sampling Equipment | Analytical Method |
|---|---|---|
| VOCs | XonTech 910A/ 912 | TO-15A (GC-MS) |
| Carbonyls | ATEC 8000 | TO-11A (UHPLC) |
| SVOCs (PAH) | PUF | TO-13 (GC-MS) |





# Continuous Measurements

| Pollutant | Sampling Equipment | Analytical Method |
|---|---|---|
| PM Mass | BAM/Thermo | Beta attenuation |
| Black Carbon | Aethalometer | Optical absorption |
| Ultrafine PM | CPC | Optical counting |
| Elements & Metals (limited) | Xact | ED-XRF |
| Ammonia (limited) | Picarro | CRDS |
| Ethylene Oxide (limited) | Aerodyne | TILDAS |



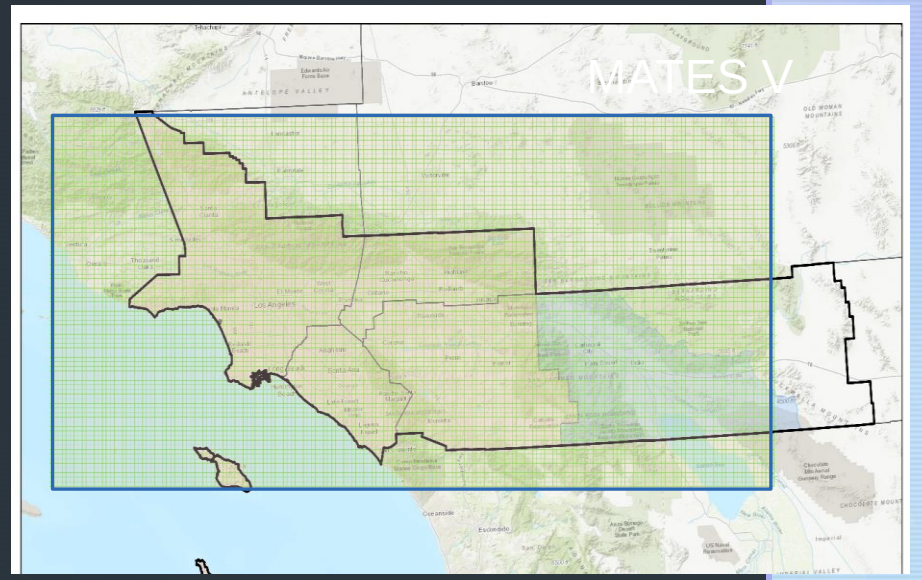

# Shareable Resources

- Data from continuous monitors
- Speciated gaseous and particulate data
- Filters from non-destructive analyses
- Limited space, power, and sampling resources at relevant air monitoring stations for additional sample collection/monitoring
- Limited laboratory resources for additional chemical analysis

# MATES VI
# Modeling Capabilities

# Regional Modeling Platforms

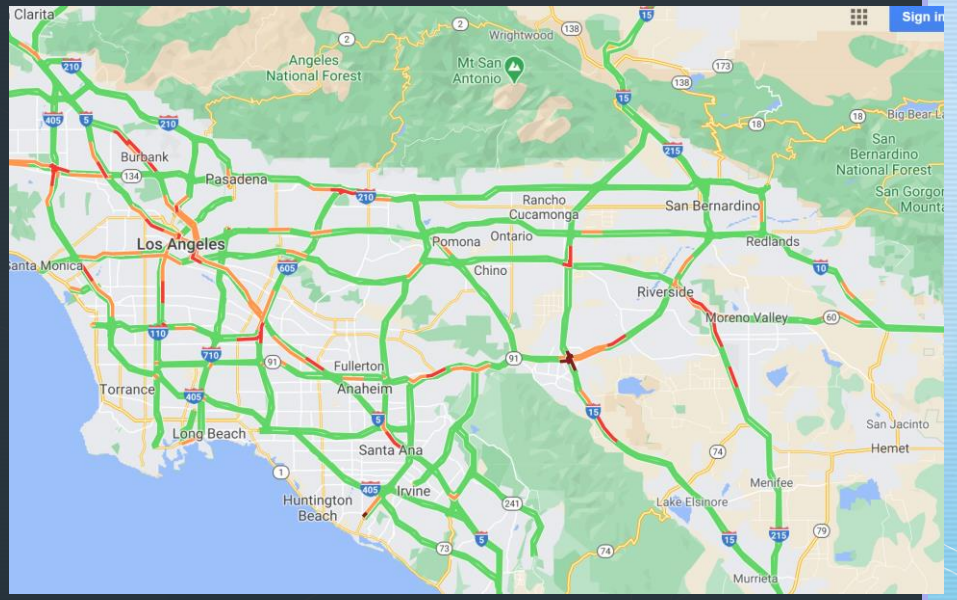
- Modeling Platform Includes Emissions, Meteorological and Chemical Transport Models – EMFAC, MEGAN, SMOKE, WRF, and CMAQ/CAMx
- Regional Modeling to Support SIP
  - 4x4km grid spacing
  - Typically with CMAQ model
  - Emissions available for 2018 and projected future milestone years (e.g., 2023, 2025, 2030)
- Air Toxics and Cancer Risk Estimates
  - 2km by 2 km grid spacing
  - Typically with CAMx with RTRAC, but CMAQ with tracer algorithm is under consideration
- Typical set-up:
  - Modeling domain covers South Coast AQMD's  jurisdiction
  - Modeling period extends to a full year



# Allocating Emissions from On-Road Mobiles Sources

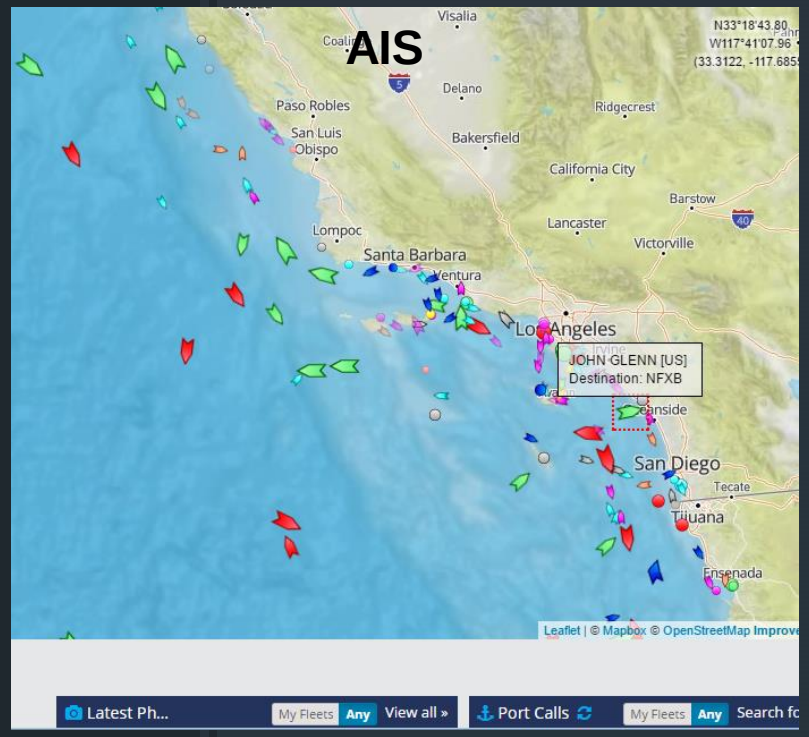
- Based on real-time sensor data
- Light and Medium duty vehicles
  - California Department of Transportation Performance Measurement System

    (Caltrans PeMS)
  - > 9000 traffic monitoring stations
- Heavy duty vehicles
  - Single loop sensors to detect Heavy Duty traffic

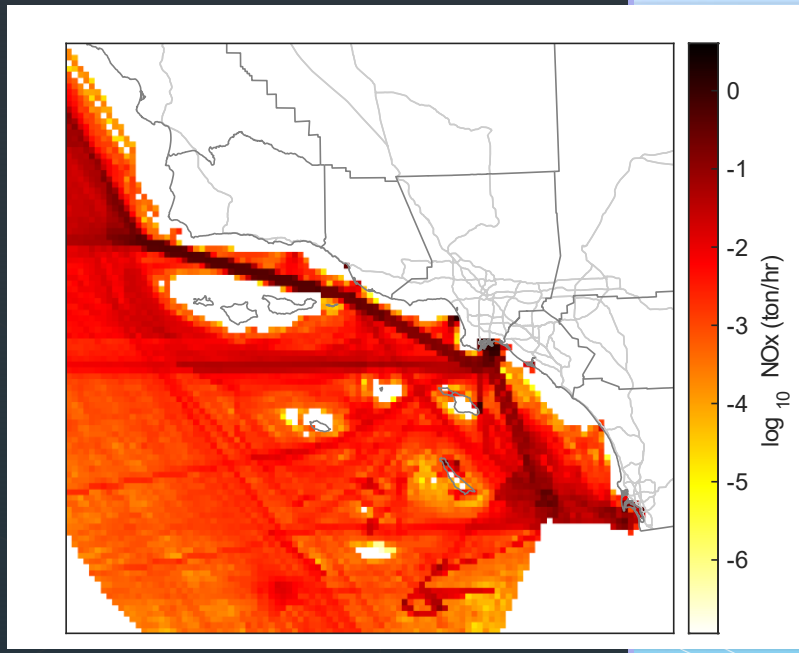


# Allocating Emissions from Ocean Going Vessels

- Automated Identification System (AIS) as provided by Marine Cadastre
- AIS transponders communicate speed, position, and operational mode for maritime safety

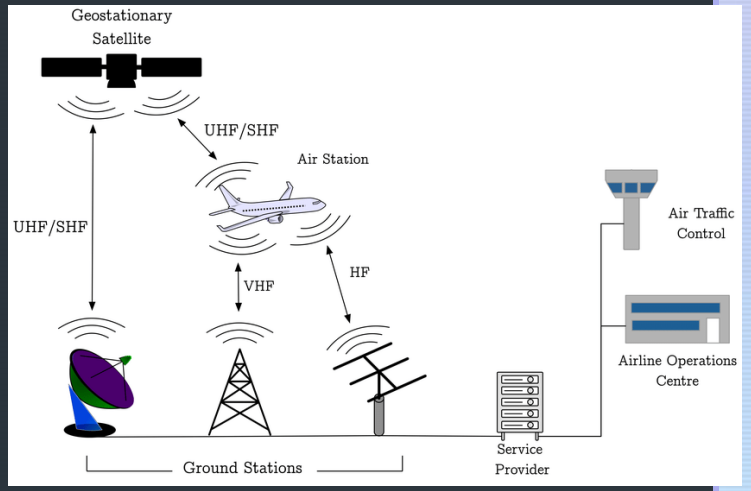



| Vessel Types | Operational Modes |
|---|---|
| Cargo (all types)<br>Military<br>Passenger<br>Tanker | Transit<br>Anchorage<br>Maneuvering<br>Hotelling |

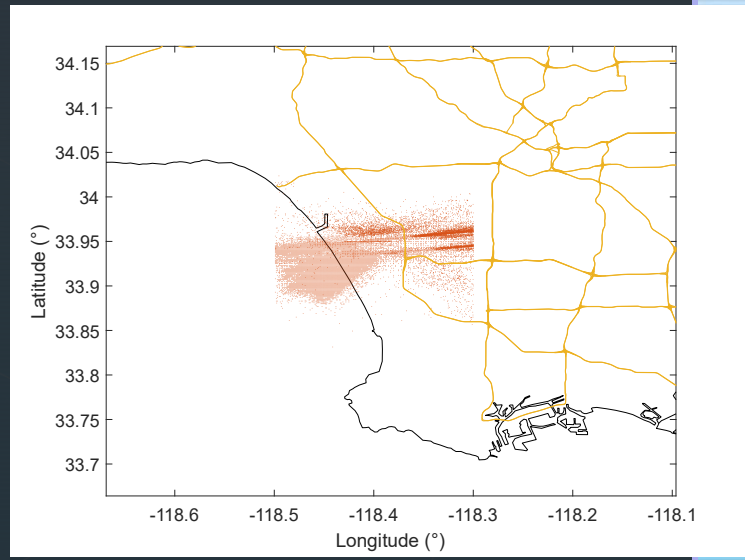


# Allocating Emissions from Aircraft

- Aircraft Communication Addressing and Reporting System (ACARS) data used for spatial allocation for large airports
- CARB's Gridded Aircraft Trajectory Emissions (GATE) is used temporal allocation of emissions and spatial allocation for small airports
- Aviation Environmental Design Tool (AEDT) is Federal Aviation Administration's official model to estimate aircraft emissions

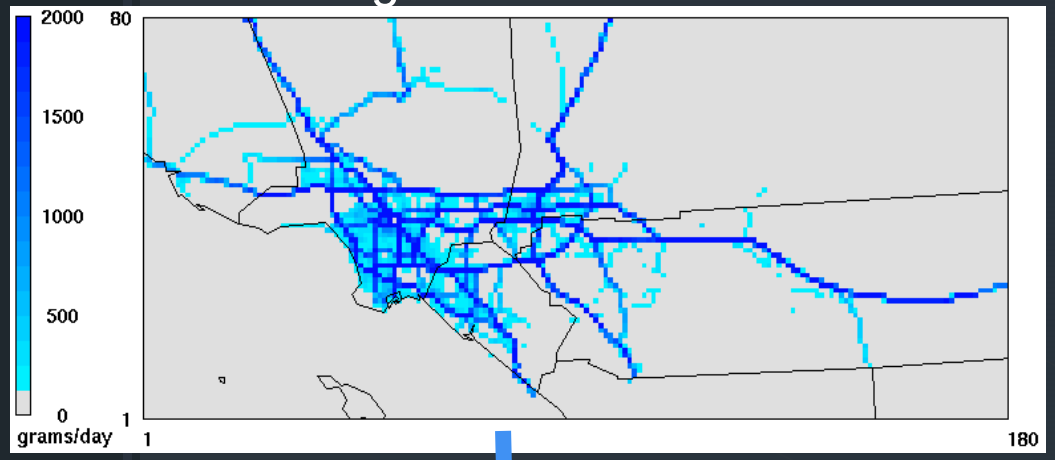



Source: Smith et al. 2016, http://dx.doi.org/10.1109/ICNSURV.2016.7486395

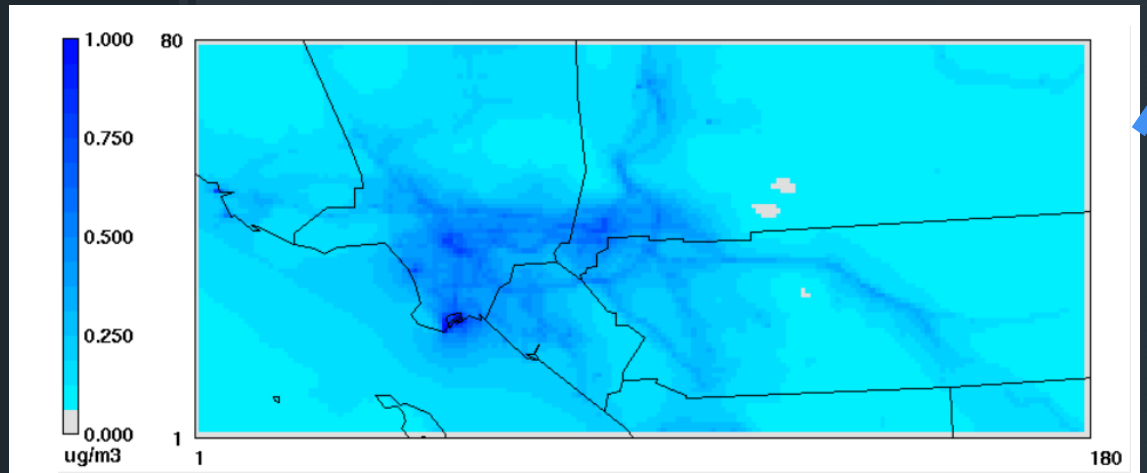


# Modeling Air Toxic Exposure

## Modeling Spatially and Temporally Resolved Emissions Tracking Air Pollutants and Toxics




## Modeling Transport and Chemistry of Primary and Secondary Air Toxics




## Calculating Exposure and Population Cancer Risk

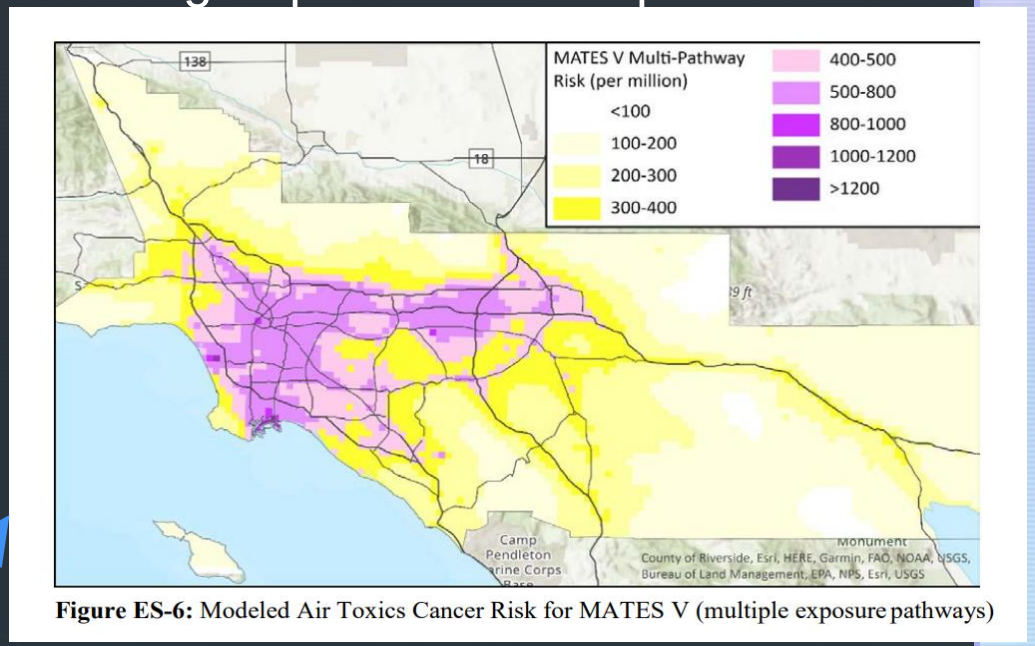
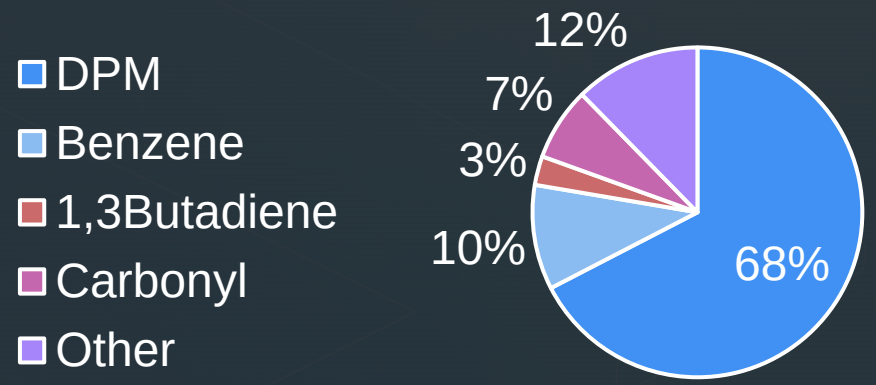



**Figure ES-6:** Modeled Air Toxics Cancer Risk for MATES V (multiple exposure pathways)

## Toxics Contribution to Cancer Risk



# Proposal Submission Procedures

# Letter(s) of Support

- Proposers must obtain letter(s) of support if proposed work relies on support that South Coast AQMD will conduct in parallel with the study
  - station locations and available space and power within monitoring shelters
  - the use of proposed monitoring equipment by South Coast AQMD staff
  - modeling-related activities that South Coast AQMD staff will conduct
- Ask questions at bidder's conferences or contact project officer to discuss the type of support that South Coast AQMD can provide
- South Coast AQMD will publish answers to questions received at bidder's conferences or to the project officer at www.aqmd.gov/mates6
  - Must submit questions by March 25, 2024
- Contact the project officer to request support
  - Must request support by April 2, 2024

# Proposal Submission Timeline

**Bidders Conference #1**
- March 8, 2024 1:00 PM PST

**Bidders Conference #2**
- March 13, 2024 8:00 AM PDT

**Last day to submit questions***
- March 25, 2024

**Request letter(s) of support***
- April 2, 2024

**Proposals due**
- May 2, 2024

**no later than 2:00 PM PDT**

**Anticipated Contract Execution**
- August 16, 2024

* Contact project officer to submit questions and request letter(s) of support

Nico Schulte, Ph.D.
Air Quality Specialist
Phone: (909) 396 - 2349
nschulte@aqmd.gov

# Proposal Submission Procedure

- **Signature** - All proposals must be signed by an authorized representative of the Proposer. Electronic signatures are acceptable.
- Hard Copies of proposals must arrive at South Coast AQMD by **May 2, 2024 no later than 2:00 PM PDT**
- **Direct to:** Procurement Unit
  South Coast Air Quality Management District
  21865 Copley Drive
  Diamond Bar, CA 91765-4178
  Phone: (909) 396-3520

- Must submit 4 hard copies of proposals in a sealed envelope
- Mark upper left-hand corner with the name and address of the Proposer and the words “Request for Proposals P2024-09”

# 3. Open Discussion

- Please ask questions about support that South Coast AQMD will conduct in parallel with the study
- Questions and South Coast AQMD responses will be posted at www.aqmd.gov/mates6
- We will answer questions as possible today, but more detailed responses may will be available at www.aqmd.gov/mates6 for questions that require follow-up