



Overview and Progress of the Multiple Air Toxics Exposure Study VI

Board Meeting
April 4, 2025

The Multiple Air Toxics Exposure Study (MATES)

- Air toxics are pollutants that can cause cancer or other serious health effects
- Variety of sources of air toxics in the region such as vehicles, industrial facilities, ships, trains, and consumer products
- MATES uses air quality measurements and modeling to determine the health risk posed by air toxics throughout the region
- MATES is unique in terms of its scope, complexity, and duration



Goals of MATES

- Provide public information about air toxics and associated health risks – focusing on regional impacts
- Evaluate progress in reducing air toxics exposure
- Provide direction to future toxics control programs
- Provide baseline data for subsequent local air toxics monitoring studies
- Identify unknown air toxics sources

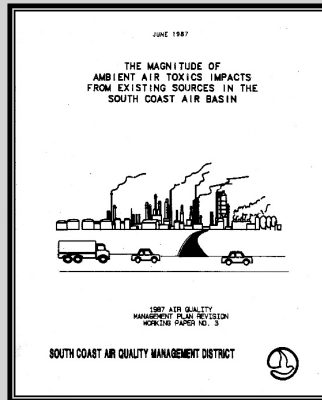


Why is MATES Conducted at Long Intervals?

- Trends are difficult to observe on short intervals
- Multi-year process to prepare a MATES analysis and report
 - Much of the work must be done sequentially
- Very complex analysis – only agency in the nation that conducts a regional air toxics analysis of this scale (>75 staff involved in MATES VI)
 - Extensive input from and coordination between field staff, laboratory staff, modeling staff, air quality assessment staff, advanced monitoring staff, and contractors
- Some modeling inputs are based on AQMP (e.g., vehicle activity)

Previous MATES Campaigns

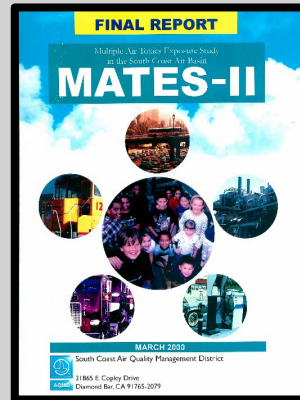
1986-1987



MATES I

Limited
Measurements
Impacts of
benzene and
Cr6

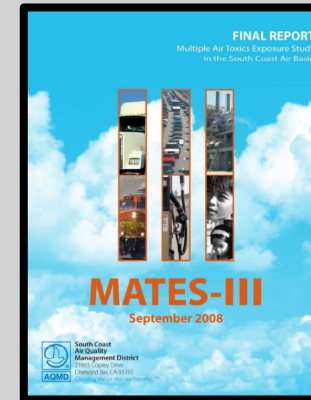
1998-1999



MATES II

Downward trend
for certain air
toxics
Diesel exhaust
accounted for
71% of cancer
risk from air toxics

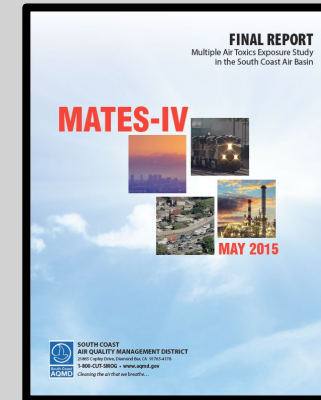
2004-2006



MATES III

Continuing
downward
trends, other
than Diesel PM
Increased Diesel
PM risk near ports
Previously
unknown Cr6
traced to
cement plant
emissions

2012-2013

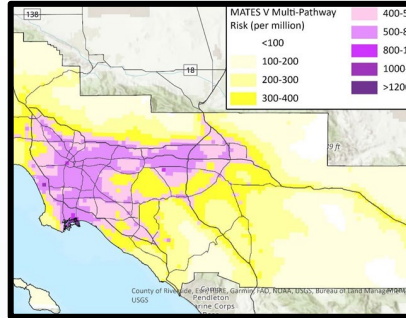


MATES IV

>50% decrease
in air toxic
cancer risk since
MATES III
68% of air toxics
cancer risk from
Diesel PM
New monitoring
techniques for
mobile sources

MATES V: Summary of Results

(2018-2019 Monitoring, 2021 Report)



Air toxics cancer risk decreased by ~50% since 2012, but risks still high



Highest air toxics cancer risk near the ports. Risk also elevated along goods movement corridors and freeways



Diesel PM is largest contributor to air toxics cancer risk



Disadvantaged communities had decreased air toxics levels, but still higher compared to Basin averages



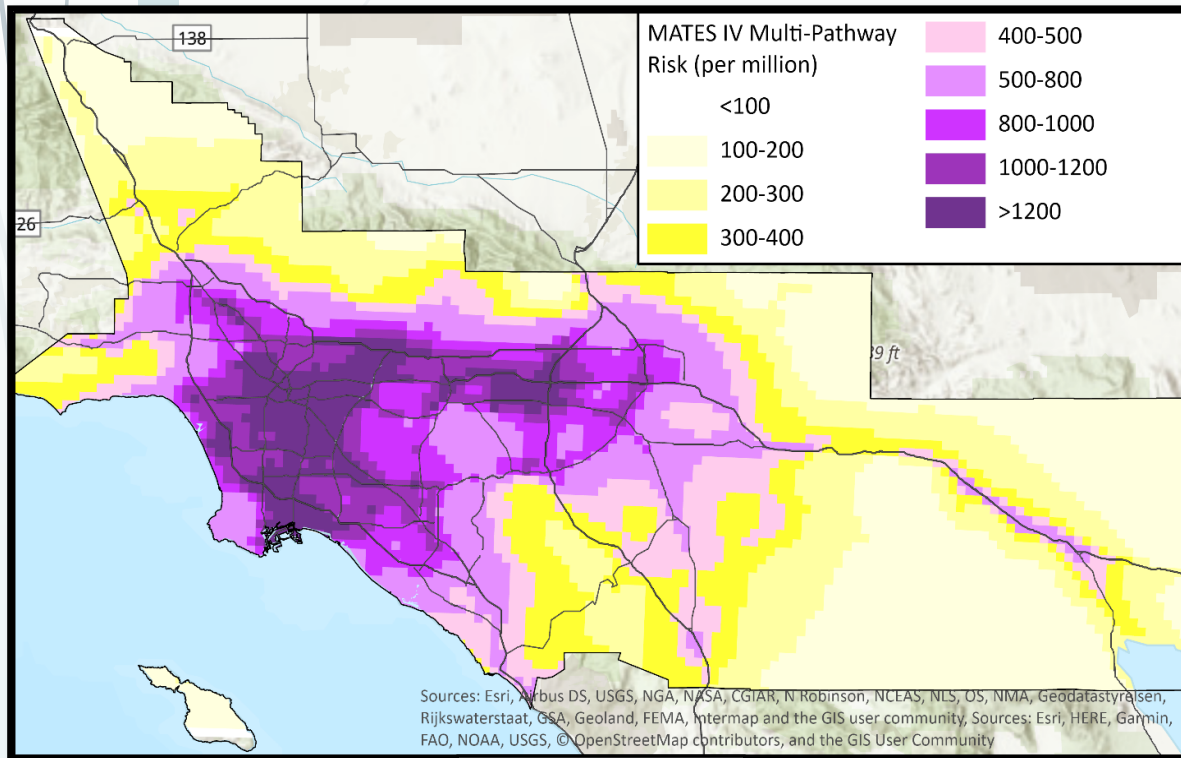
Advanced air monitoring methods and techniques evaluated at and near refineries



Chronic non-cancer health impacts estimated for first time, with a chronic hazard index of 4.5 - 8 across the 10 stations

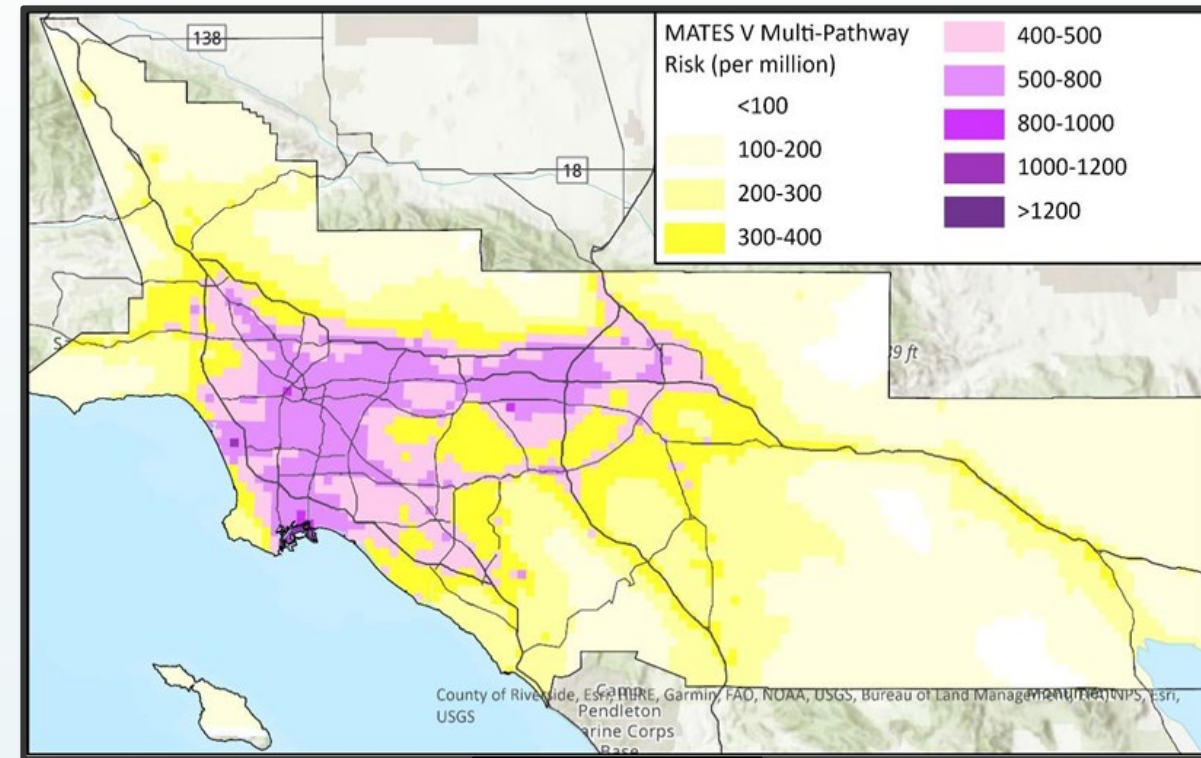
Air Toxics Cancer Risk – Modeling Data

MATES IV (population-weighted):
South Coast Air Basin: **997-in-a-million**
Coachella Valley: **357-in-a-million**



2012

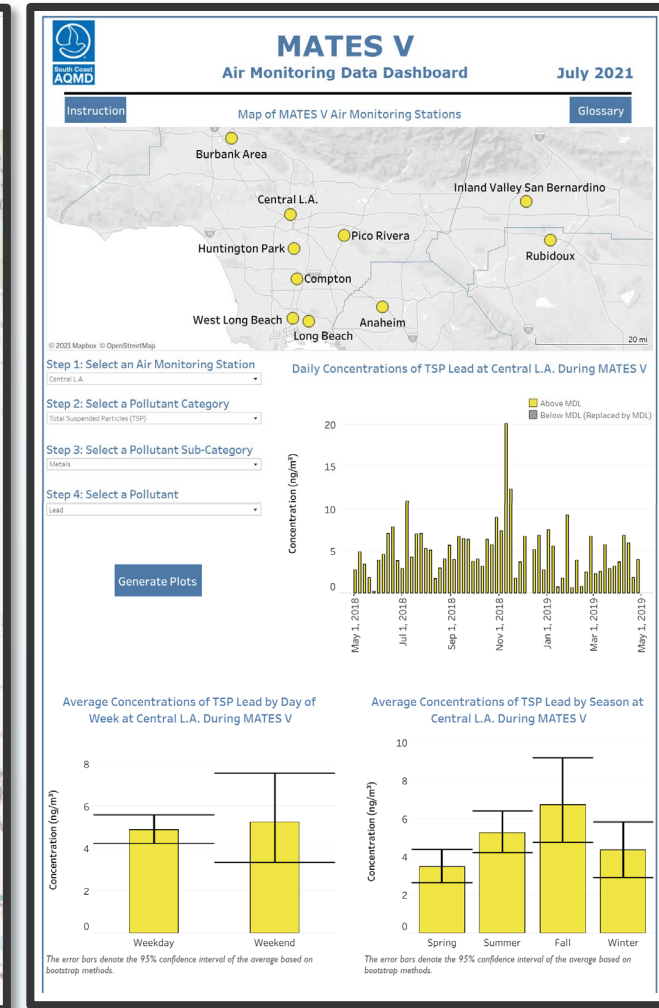
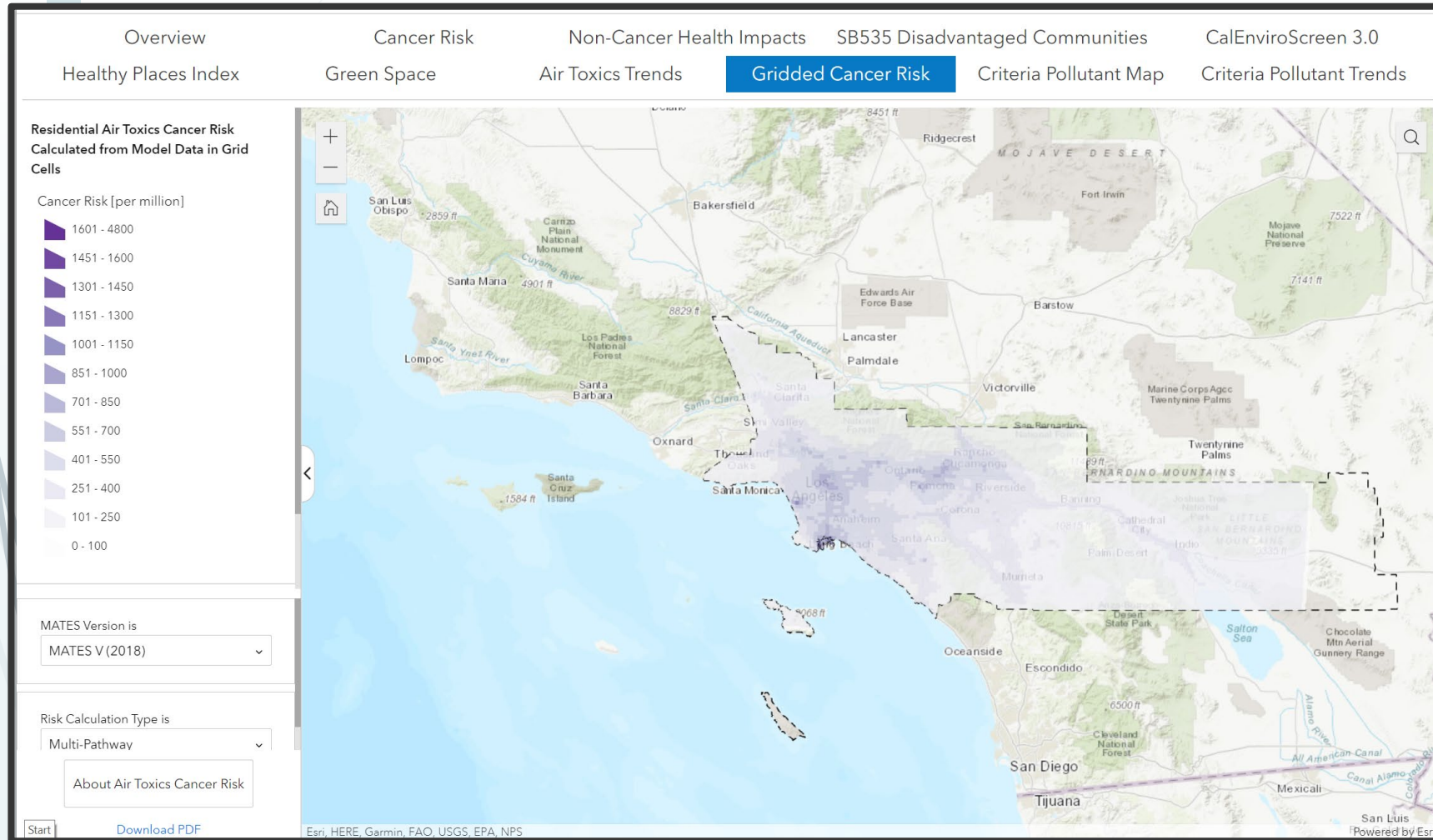
MATES V (population-weighted):
South Coast Air Basin: **455-in-a-million**
Coachella Valley: **250-in-a-million**



2018

MATES V Data Visualization Tool & Air Monitoring Dashboard

www.aqmd.gov/MATES5



Resource Requirements



Infrastructure

- 10 Fixed monitoring stations
- Expansion of Near Road sites to accommodate additional equipment
- Computational resources and storage



Air Monitoring Equipment, Maintenance, and Supplies

- Real-time and time-integrated measurements
- Over 120 real-time monitors, samplers, and meteorology stations
- Weekly visits to all sites for the operation and maintenance of the monitoring equipment and sample collection

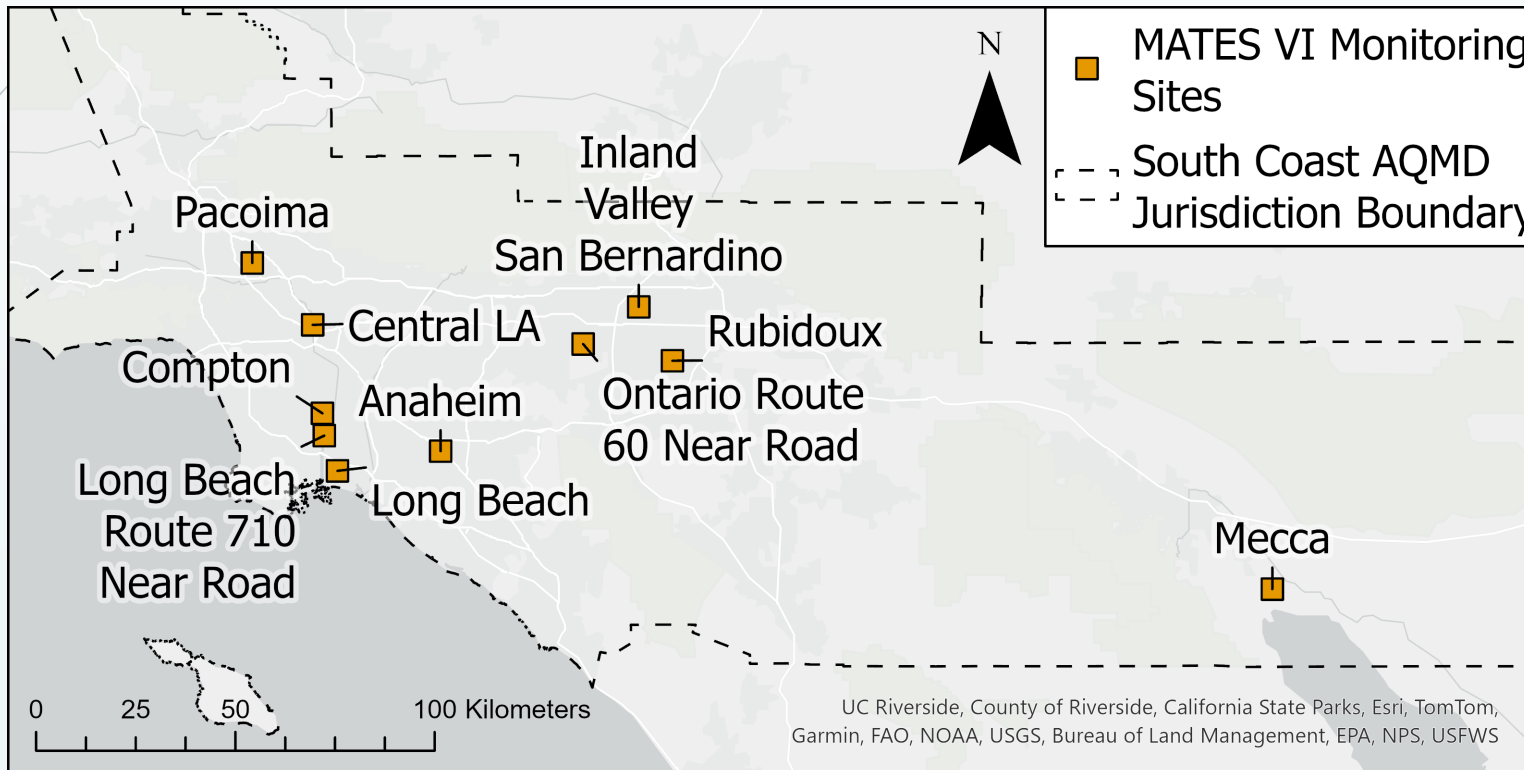


Laboratory Equipment, Maintenance, and Supplies

- Over 5500 samples to be collected and 8000 analyzed in the lab
- Replacement and maintenance of laboratory VOC analysis equipment
- Contract lab analyses for specific pollutants

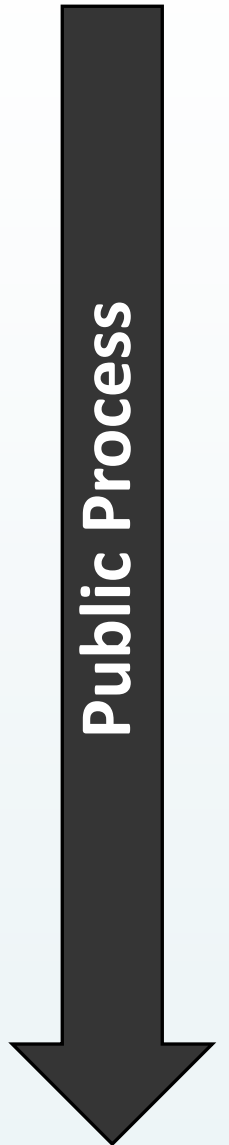
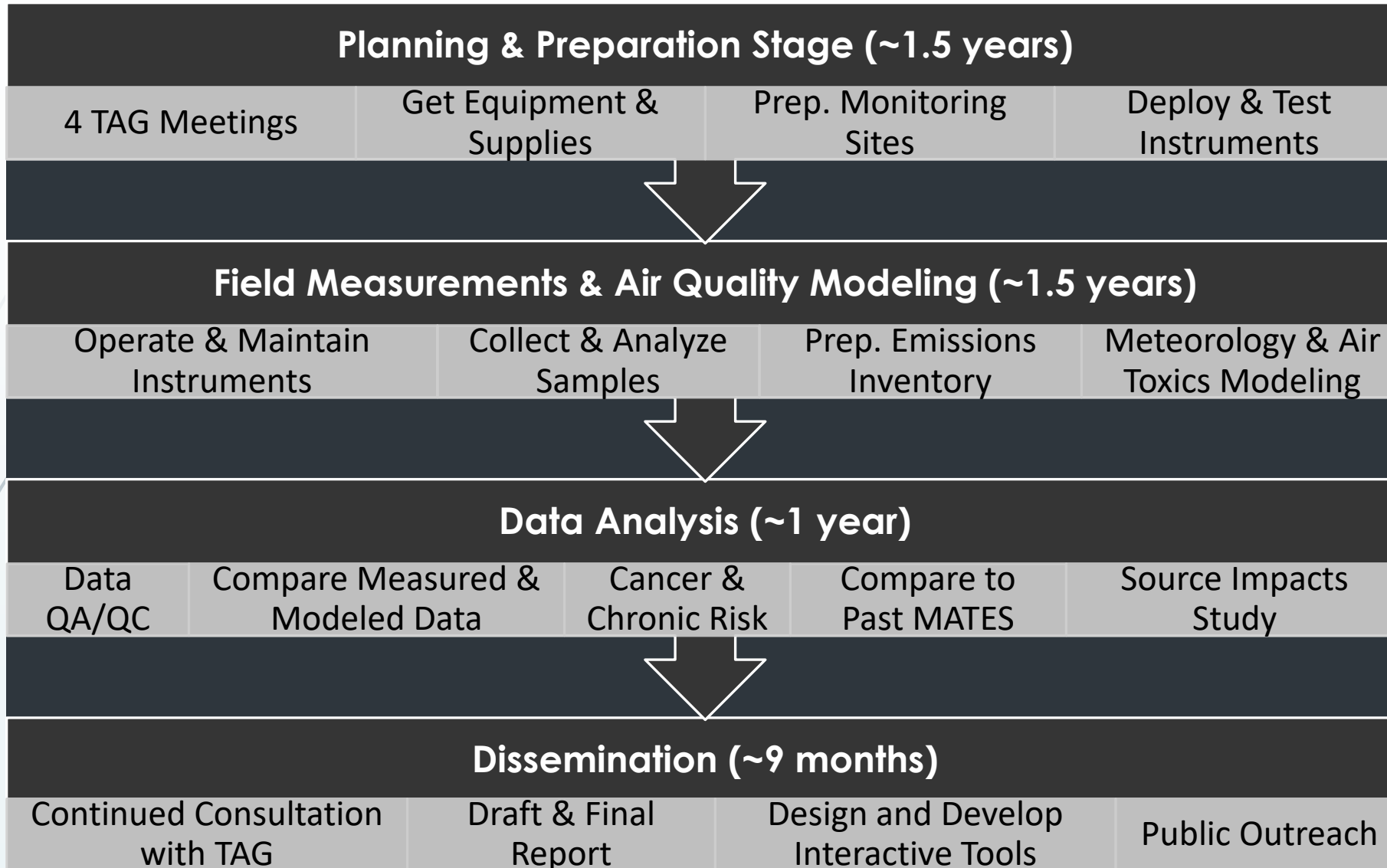
MATES VI Air Monitoring Locations

- Air Monitoring Campaign at 10 Locations
 - South Coast Air Basin and Coachella Valley*
 - Two Near-Road Sites*



* New for MATES VI10

MATES VI Process



Special Studies as Part of MATES VI



**Initial Evaluation of Brake &
Tire Wear Contribution to
PM**



**Ethylene Oxide
Measurements and Risk
Analysis**

Brake and Tire Wear



BRAKE WEAR



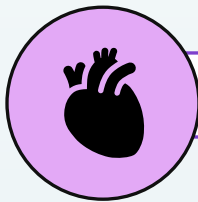
TIRE/ROAD WEAR



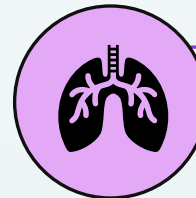
ROAD-DUST
RESUSPENSION

- Brake and tire wear is becoming a larger fraction of total air toxics emissions from vehicles

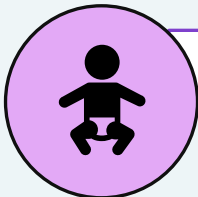
Potential Health Effects Identified in Peer-Reviewed Literature



Cardiovascular impacts



Respiratory impacts

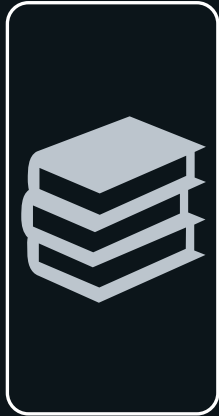


Reproductive impacts



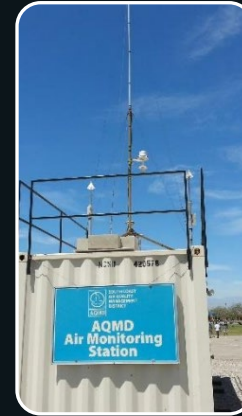
Neurologic impacts

Brake and Tire Wear Study Underway with Emission Analytics



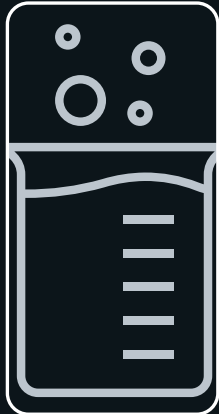
Literature Review

- Identify composition of brake, tire, and road dust particles, and VOCs that off-gas from tires and brakes



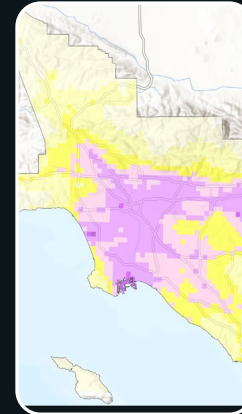
Field Measurements during MATES VI campaign

- South Coast AQMD will provide particle samples at the 10 MATES VI measurement stations



Lab Measurements

- Test brake systems on dynamometer to determine brake emission 'fingerprints'
- Analyze organic compounds from field samples



Data Analysis and Calculation

- Tire, brake, & road dust concentrations in ambient particles
- 2-km resolution modeling

Ethylene Oxide Measurements & Risk Analysis

- Ethylene Oxide (EtO) is a potent air toxic that can cause cancer
- Following EPA's finding that health risks from EtO are higher than previously thought, in 2022 South Coast AQMD initiated several actions for facilities that emit EtO*
 - Air monitoring
 - Compliance/Enforcement
 - Risk reduction measures via AB 2588/Rule 1402 (Air Toxics Hotspots Program)
 - Amended Rule 1405 (Control of EtO from Sterilization and Related Operations)
 - Permitting
- OEHHA** considering updates to its cancer risk factor
 - Risk from EtO may be significant compared to risk from other pollutants

* <https://www.aqmd.gov/home/eto>

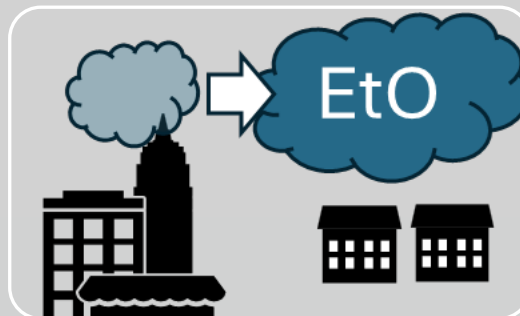
** California Office of Environmental Health Hazard Assessment

Ethylene Oxide Measurements and Risk Analysis

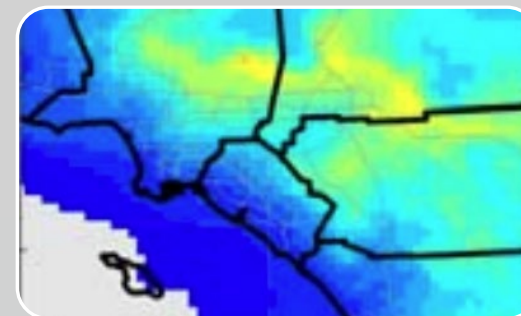
EtO Research Needs in MATES VI:



How much EtO is entering the Basin as “background” relative to the EtO that we are producing locally?
(In-house study)

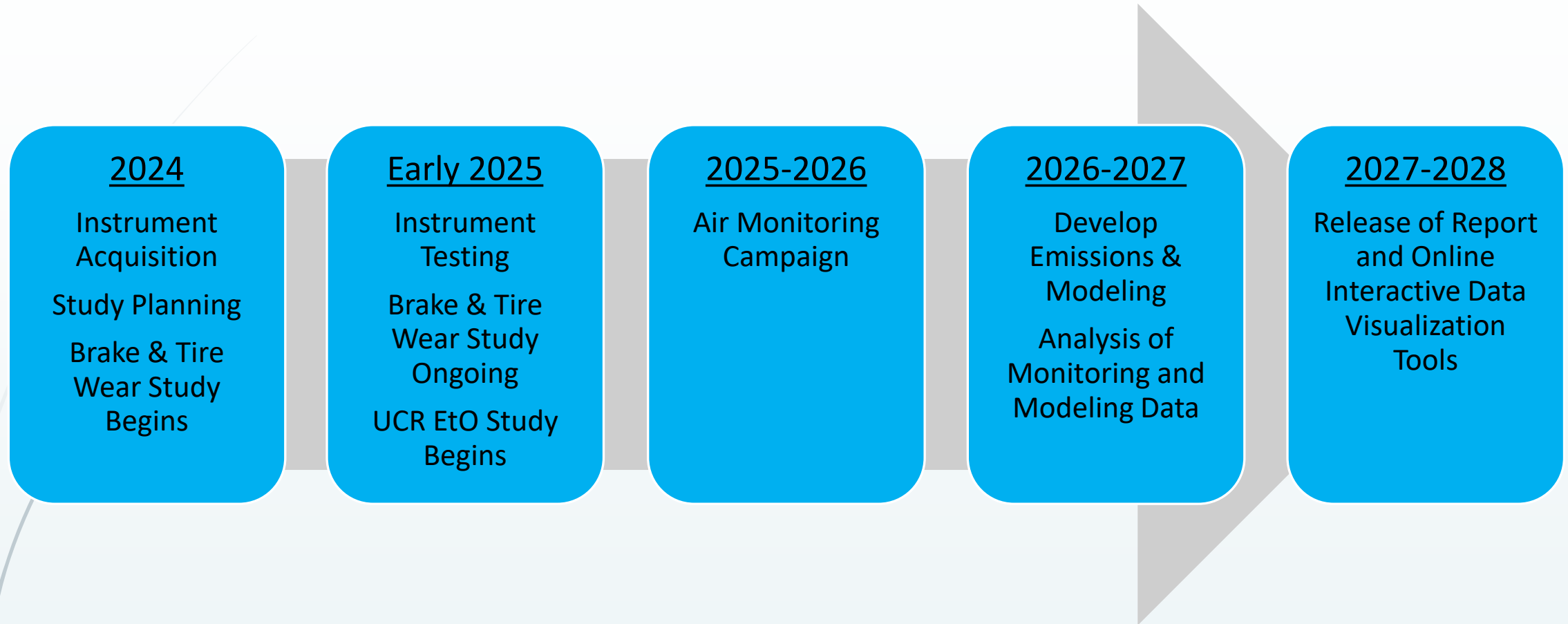


Does EtO form in the atmosphere and what reactions are involved?
(Contract with UCR)



What are appropriate modeling techniques to predict EtO concentrations and risk?
(In-house study)

Tentative Timeline* & Next Steps



- MATES VI homepage: www.aqmd.gov/MATES6
- Sign up for more info at www.aqmd.gov/sign-up

* Schedule subject to change