



# Community-Based Air Monitoring in the South Coast Air Basin

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**NACAA Fall Membership Meeting – Washington, DC**

**October 18 - 20, 2010**

# Traditional Air Monitoring

- **Permanent, large, fixed sites**
- **Criteria pollutants**
- **Addresses NAAQS**
- **Meets all CFR minimums and requirements**
- **Away from sources**
- **Neighborhood, urban or regional scale**

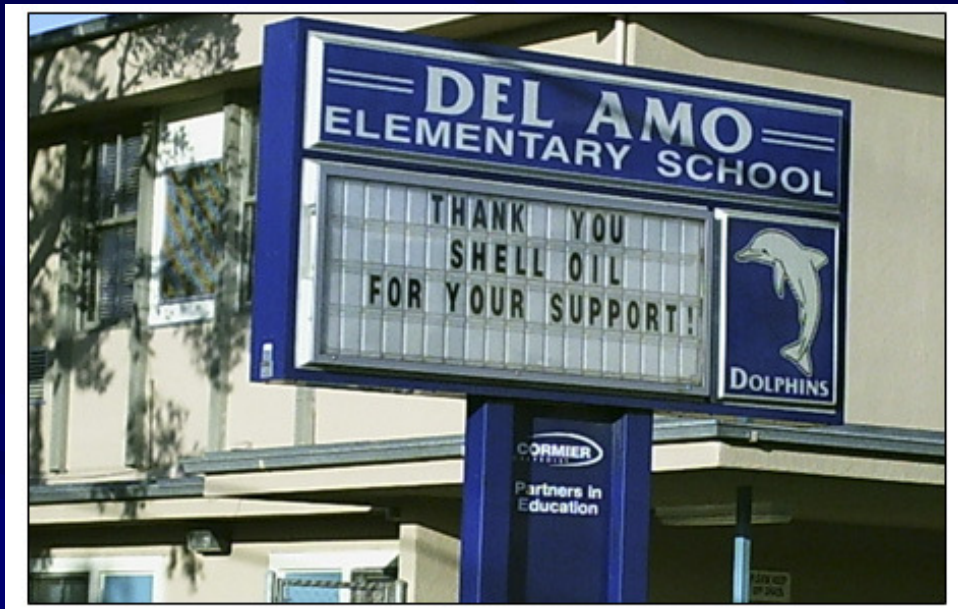
# Community-Based Air Monitoring

- **Addresses local concerns and issues**
- **Often source-specific**
- **Micro or middle scale**
- **Non-regulatory**
- **Temporary and/or mobile platforms**
- **Different approaches for different situations**
- **Enlist the help of citizens**
- **Risk communication**

# Examples from South Coast

- **Most common citizen complaints**
  - **Odors**
  - **Dust**
  - **Smoke**
- **Examples**
  - **Del Amo Elementary**
  - **Dust from mining or construction**
  - **Hexavalent Chromium from Cement Plants**
  - **Wildfire PM monitoring**

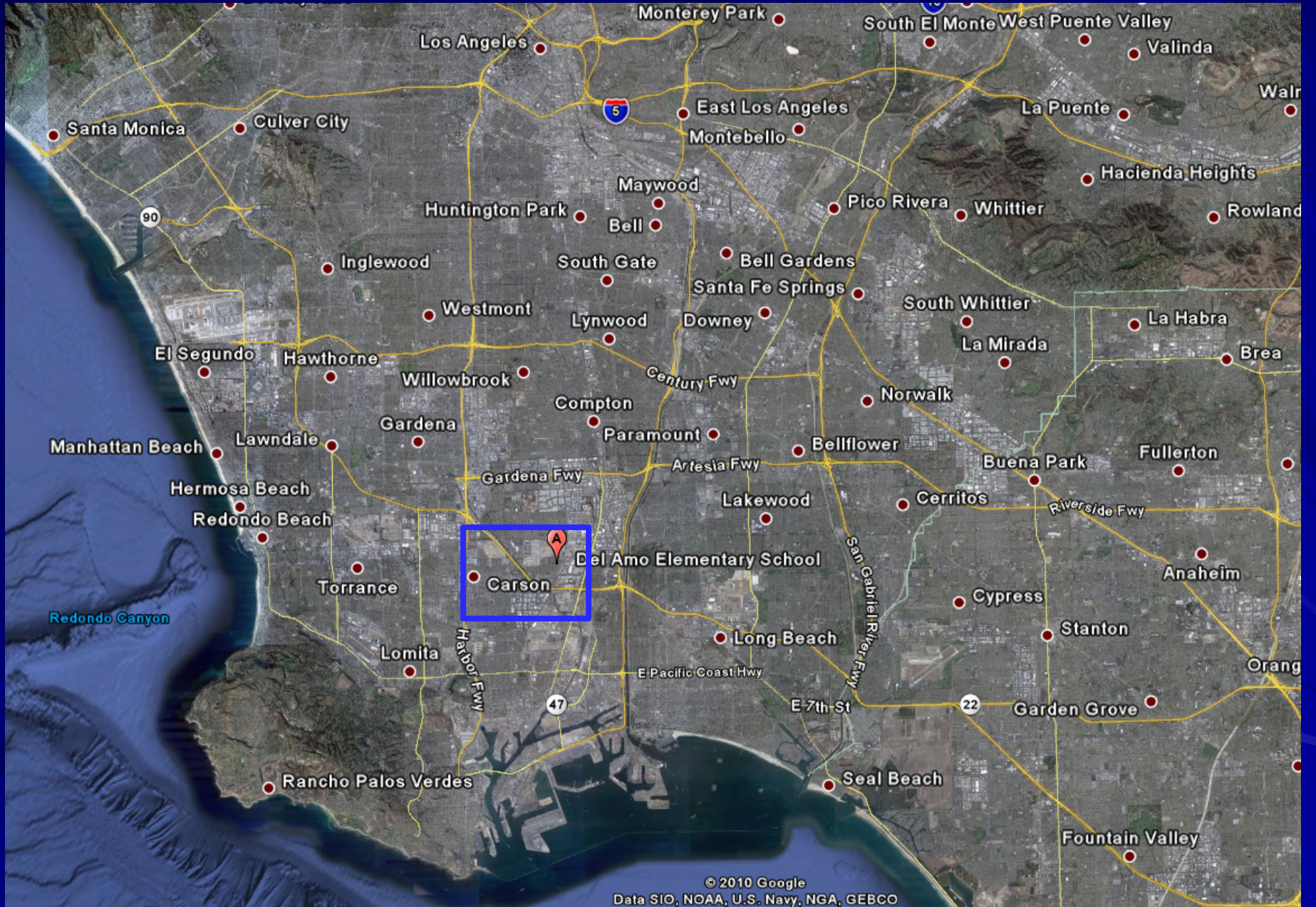




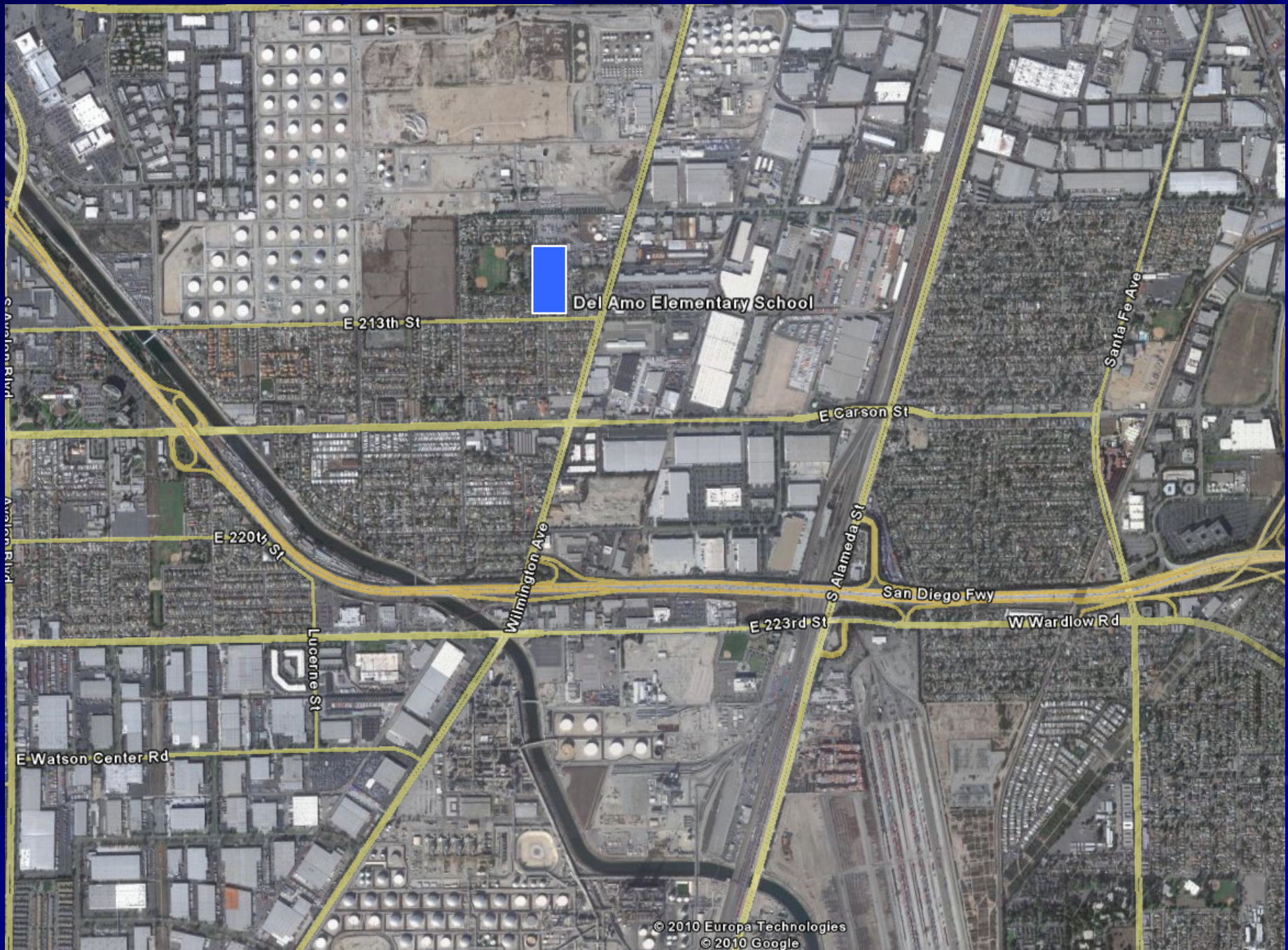
- **Carson, CA**
- **Opened 1949**
- **K through 5**
- **2008-09: 462 students**
  - **47% Hispanic**
  - **18.8% Filipino**
  - **16.5% Black**
  - **14.5% Pac. Islander**
  - **1.5% White**
  - **1.5% Asian**

**Source: LAUSD Website**









Del Amo Elementary School

E 213th St

E Carson St

E 220th St

Wilmington Ave

S Alameda St

San Diego Fwy

E 223rd St

W Wardlow Rd

Santa Fe Ave

E Watson Center Rd

Lucerne St



# Complaints and Letters

- Letter from all school staff Feb. 2006 complaining of poor air quality and health problems
- Frequent odor complaints between January and May, 2006
- “Burnt plastic” “sulfur” “petroleum” “chemical”
- 23 letters from individual staff between May 10 and May 19, 2006

**OFFICE REFERRAL FORM**

PUPIL'S NAME: Mikavla Pascual GRADE: K ROOM: [redacted]

To: [redacted]

see:  [redacted]  Asst. Principal  Clerk  Nurse

Reason for referral:  Absence  Information needed  Behavior  Tardy too often  Health  Other

Explanation of referral: Severe headache. She is in tears!!  
She never complains. The air in the room has an odor

Citizenship usually:  Satisfactory  Unsatisfactory (CHECK ONE IF REFERRED FOR BEHAVIOR)

***No complaints from the neighborhood around the school***

# Grab Sampling

- Given to school staff
- Evacuated Canister for VOCs
- Bag for sulfur compounds
- Full training provided
  - Open/close valve
  - Turn a key
- Kept in a central location



# Odor Event Logs

Observer Name: Del Amo ES

Street Address: \_\_\_\_\_

City & Zip: \_\_\_\_\_

Area Code/Phone #: / \_\_\_\_\_

## Odor Event Observation Log

**INSTRUCTIONS:** For each odor event, please:

- ✓ Log nature of the event, the observation type (check odor), physical effects, if any, and the name(s) of anyone affected, along with the date and time the event occurred.
- ✓ Indicate if odors were observed indoors, outdoors, or both.
- ✓ Call 1-800-CUT-SMOG to log air quality complaint with AQMD.

Date	Nature of Event	Observation	Observation period		Physical effects, if any, and name of child/adult affected	Where odor noticed	Was AQMD called?
			From	To			
1/19	<input type="checkbox"/> Intermittent	<input checked="" type="checkbox"/> Odor	7:40	8:20	Chemical 8:10 49° 70 wind	<input type="checkbox"/> Inside	<input checked="" type="checkbox"/> Yes
	<input checked="" type="checkbox"/> Continuous 8:04	<input checked="" type="checkbox"/> Odor	8:05		Sulfur wind 1mph SW	<input checked="" type="checkbox"/> Outside	<input type="checkbox"/> No
1/29	<input type="checkbox"/> Intermittent	<input checked="" type="checkbox"/> Odor	10:05		Gas Odor 1-3 miles NW	<input type="checkbox"/> Inside	<input checked="" type="checkbox"/> Yes 10:10am
	<input checked="" type="checkbox"/> Continuous	<input type="checkbox"/> Odor			57° 76% H	<input checked="" type="checkbox"/> Outside	<input type="checkbox"/> No
1/30	<input type="checkbox"/> Intermittent	<input checked="" type="checkbox"/> Odor	10:10		Sulfur 520 93H 9-6mph	<input type="checkbox"/> Inside	<input checked="" type="checkbox"/> Yes 10:10
	<input checked="" type="checkbox"/> Continuous	<input type="checkbox"/> Odor			wind 7 mile south 72° S-SE	<input checked="" type="checkbox"/> Outside	<input type="checkbox"/> No
	<input type="checkbox"/> Intermittent	<input type="checkbox"/> Odor				<input type="checkbox"/> Inside	<input type="checkbox"/> Yes
	<input type="checkbox"/> Continuous	<input type="checkbox"/> Odor				<input type="checkbox"/> Outside	<input type="checkbox"/> No
	<input type="checkbox"/> Intermittent	<input type="checkbox"/> Odor				<input type="checkbox"/> Inside	<input type="checkbox"/> Yes
	<input type="checkbox"/> Continuous	<input type="checkbox"/> Odor				<input type="checkbox"/> Outside	<input type="checkbox"/> No

Your participation makes a difference! Thank you for working with AQMD to improve the air quality in your area.

# Additional AQMD VOC Sampling

- Three days (August, 18, 21, 24, 2006)
- Three 8-hour samples and one 24-hour sample each day
- Results were typical for area
- Grab samples a better option for fleeting odors





# Complete Air Monitoring Station at Del Amo

- Part of larger Port Area Study
- One of 6 sites
- March 2007 – January 2009
- Full criteria pollutants, air toxics and met monitoring, plus ultrafines and black carbon





# Other Issues at Del Amo

- **Numerous public meetings led by LAUSD**
  - Department of Toxic Substances Control (DTSC)
  - City of Carson
  - Los Angeles County Fire Department
  - Los Angeles County Public Health Department
  - South Coast Air Quality Management District (AQMD)
- **DTSC soil sampling – solvent migration at north end of playground**
- **Very high levels of methane found under black-top**
  - Abandoned natural gas line not capped properly
  - Immediate trenching and soil vapor extraction

# **Extensive AQMD Compliance Activities**

- **Respond quickly to complaints (Hot List)**
- **Tracking of odors to sources when possible**
- **Multiple area sweeps for unpermitted sources**
- **Repeated inspections of facilities**
- **Continued surveillance at school and at Rainbow Trucking (Oct 2007- Jan 2008)**
- **Grab samples during odor events**

# Grab Sample Results

- Over 90 cans and 3 bags between 2006 and present, most by school staff
- Elevated levels of hydrocarbons and H<sub>2</sub>S
- No single consistent pattern
- Nothing above or near acute exposure limits



# Ethanol

- May 8 ,2007 grab sample by staff
- May 9, 2007 meeting, odor occurred, grab sample also showed Ethanol, MEK
- All below acute limits

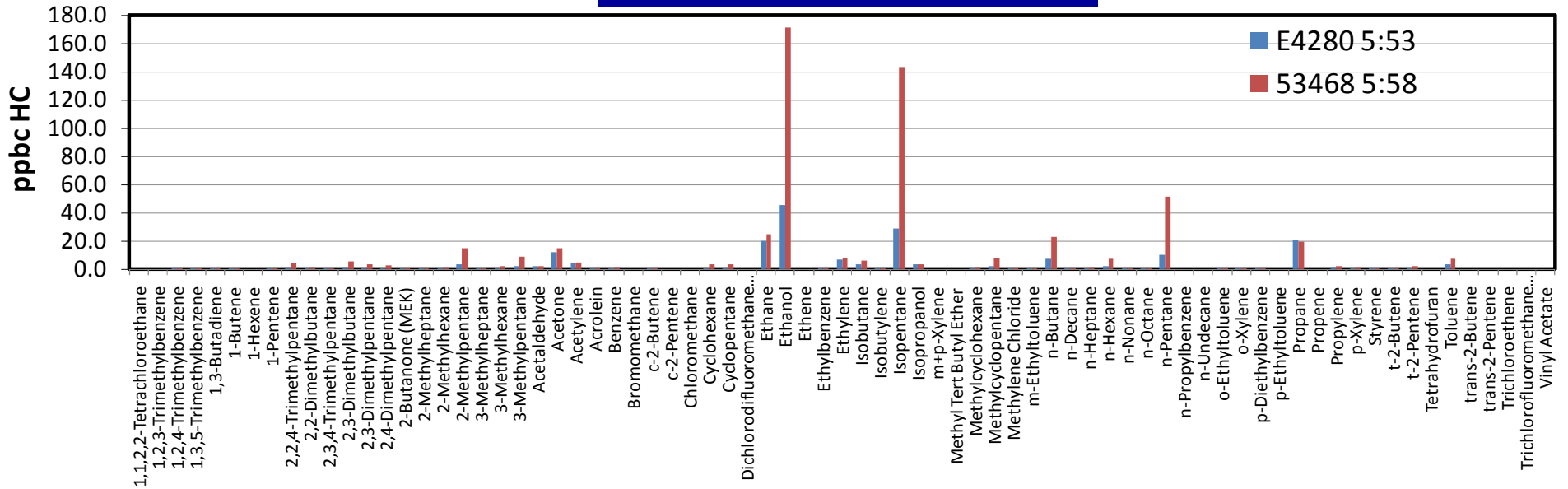
Summary Report				
Del Amo School				
Instantaneous/Grab Samples				
Date Time	5/7/07 0815	5/8/07 1150	5/9/07 1945	Typical Ambient Ai
Compound, ppb				
Ethane	5.3	6.7	1.3	3.0
Ethylene	2.3	1.2	0.4	1.1
Acetylene	4.5	1.7	0.6	2.4
Propane	14.9	23.4	2.5	6.4
Freon-12	0.5	0.5	0.3	0.3
Propylene	2.5	29.4	0.5	0.8
Isobutane	1.8	60.0	1.0	1.4
n-Butane	2.7	26.2	2.5	1.9
1-Butene	0.2	3.6	0.1	0.1
1,3-Butadiene	0.3	0.1	<0.1	0.1
trans-2-Butene	0.1	3.4	0.1	<0.1
Isobutylene	0.6	6.9	0.2	0.2
Acetaldehyde	3.0	33.9	1.3	3.4
cis-2-Butene	N.D.	<0.1	N.D.	<0.1
Ethanol	40.3	1220.0	96.7	7.3
Isopentane	5.7	64.2	5.3	2.1
Acetone	17.7	19.9	3.7	9.9
Freon-11	0.2	0.2	0.2	0.3
1-Pentene	0.1	2.5	0.1	<0.1
Isopropyl Alcohol	2.6	49.9	3.0	0.7
n-Pentane	2.2	12.0	2.0	0.9
Isoprene	0.8	0.7	<0.1	<0.1
trans-2-Pentene	0.2	1.3	0.2	<0.1
cis-2-Pentene	0.1	0.9	0.1	<0.1
Methylene Chloride	0.3	0.6	0.1	0.2
2,2-Dimethylbutane	0.5	0.5	0.2	0.2
Cyclopentane	0.4	1.2	0.2	0.1
2,3-Dimethylbutane	0.8	2.3	0.3	0.2
Methyl Tert Butyl Ether (MTBE)	N.D.	N.D.	N.D.	<0.1
2-Methylpentane	2.0	7.7	0.9	0.7
2-Butanone (MEK)	1.5	128.0	20.4	0.8
3-Methylpentane	1.4	4.2	0.6	0.4
n-Hexane	1.2	2.5	0.6	0.6
Ethyl Acetate	0.2	0.2	N.D.	0.1

# Automatic Grab Sampler System

- Uses a TNMHC Analyzer
- Triggers a grab sample when TNMHC exceeds a threshold
- Combine with detailed wind direction data

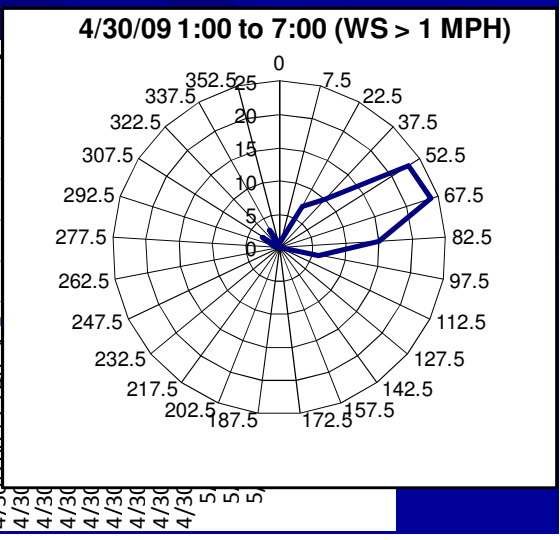
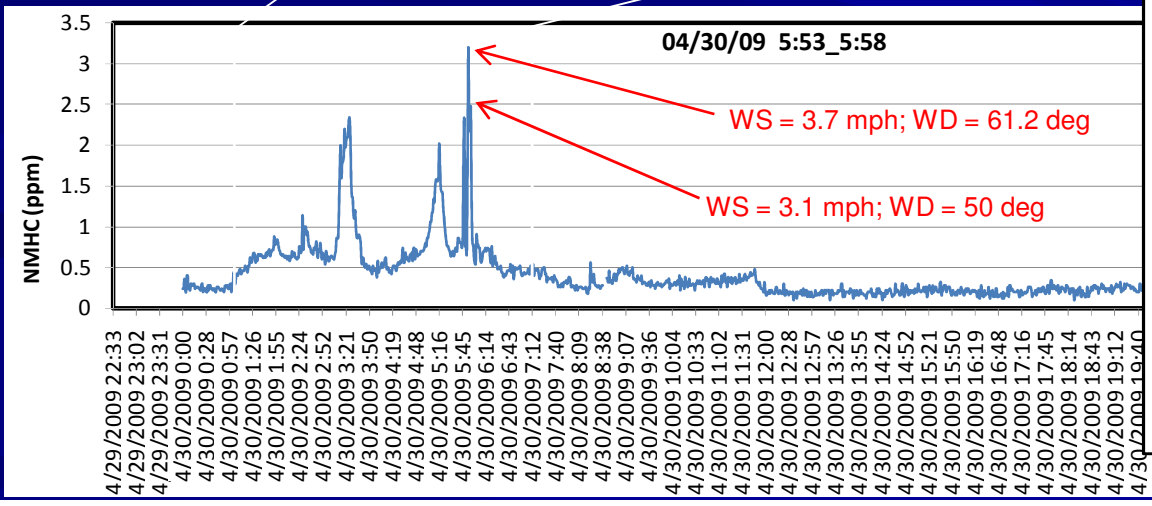


4/30/09\_5:53am\_5:58am



Frequency count (

**Total NMOC**  
E4280: 748 ppbC HC  
E53468: 2180 ppbC HC



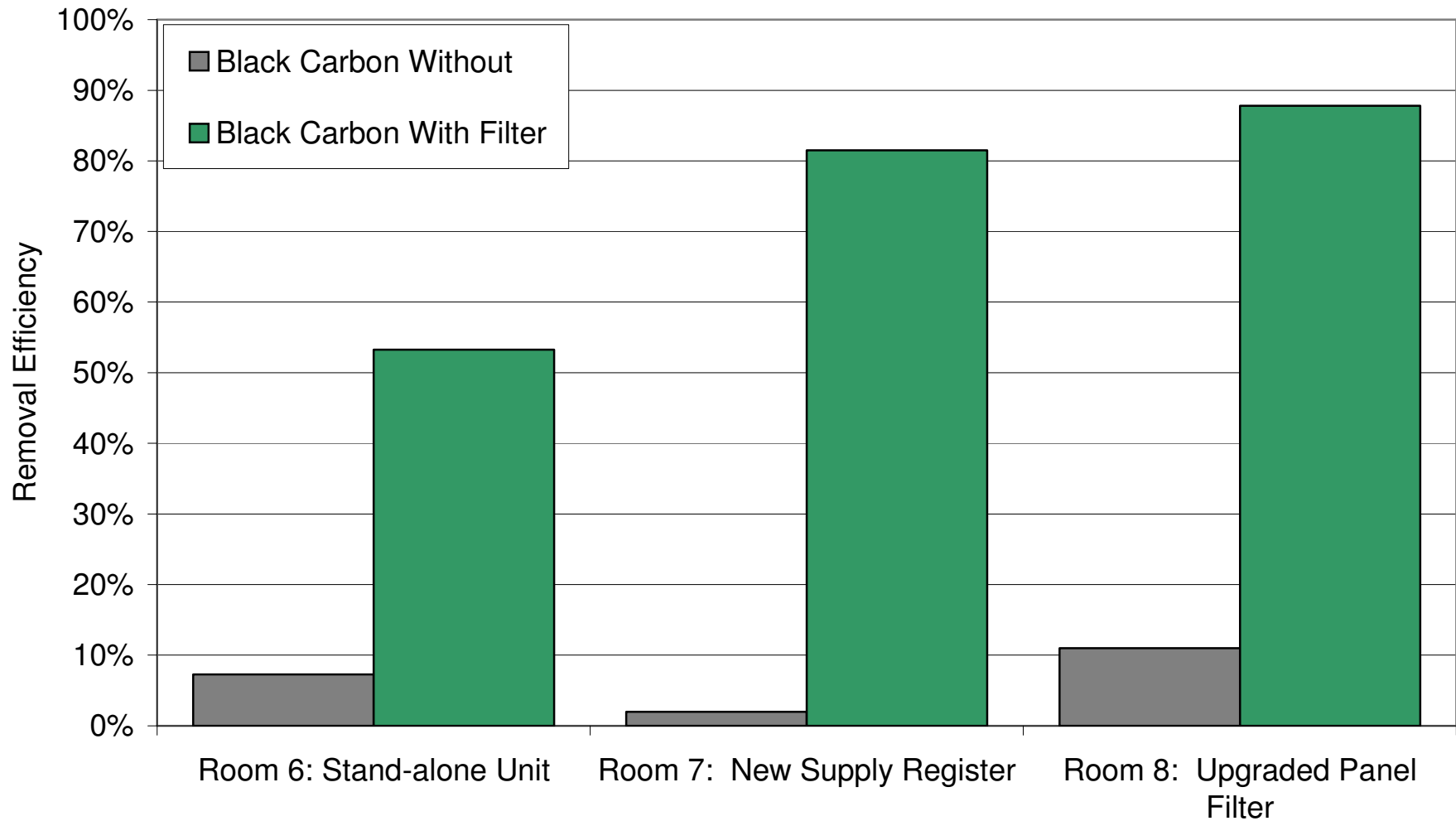


# Classroom Filtration Pilot Study

- Test high efficiency filtration techniques to reduce indoor exposure
- Three classrooms at Del Amo selected for Pilot
- Testing in April 2008
- Excellent results for PM, ultrafine and black carbon



## Black Carbon Removal Efficiency





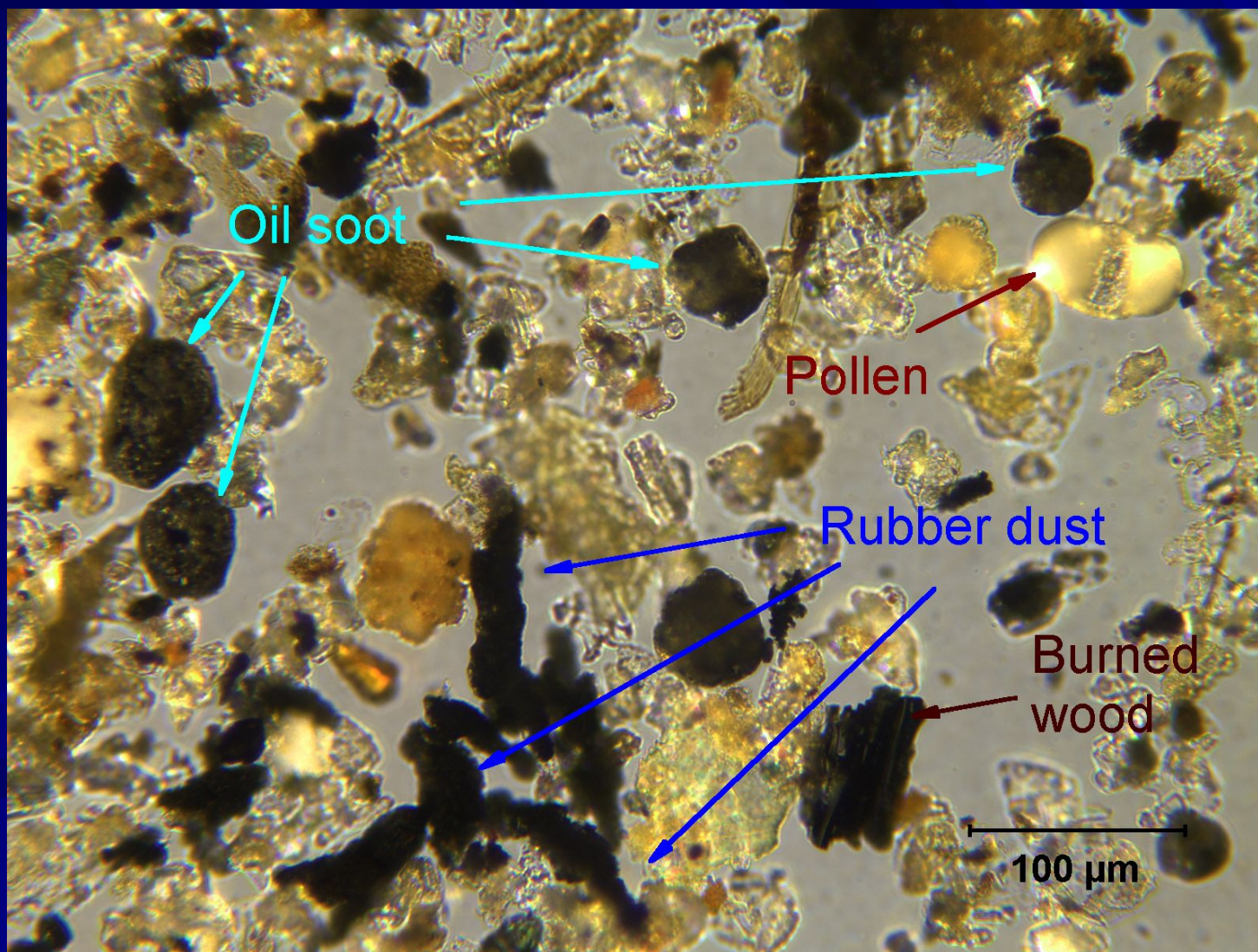
# Current Status

- **36 automatic grab samples**
- **Patterns in chemical signature vs. wind direction are emerging**
- **Points to multiple sources of odors**
- **Complaint frequency has significantly diminished**
- **All classrooms now have high efficiency filtration**

# Dust Complaints

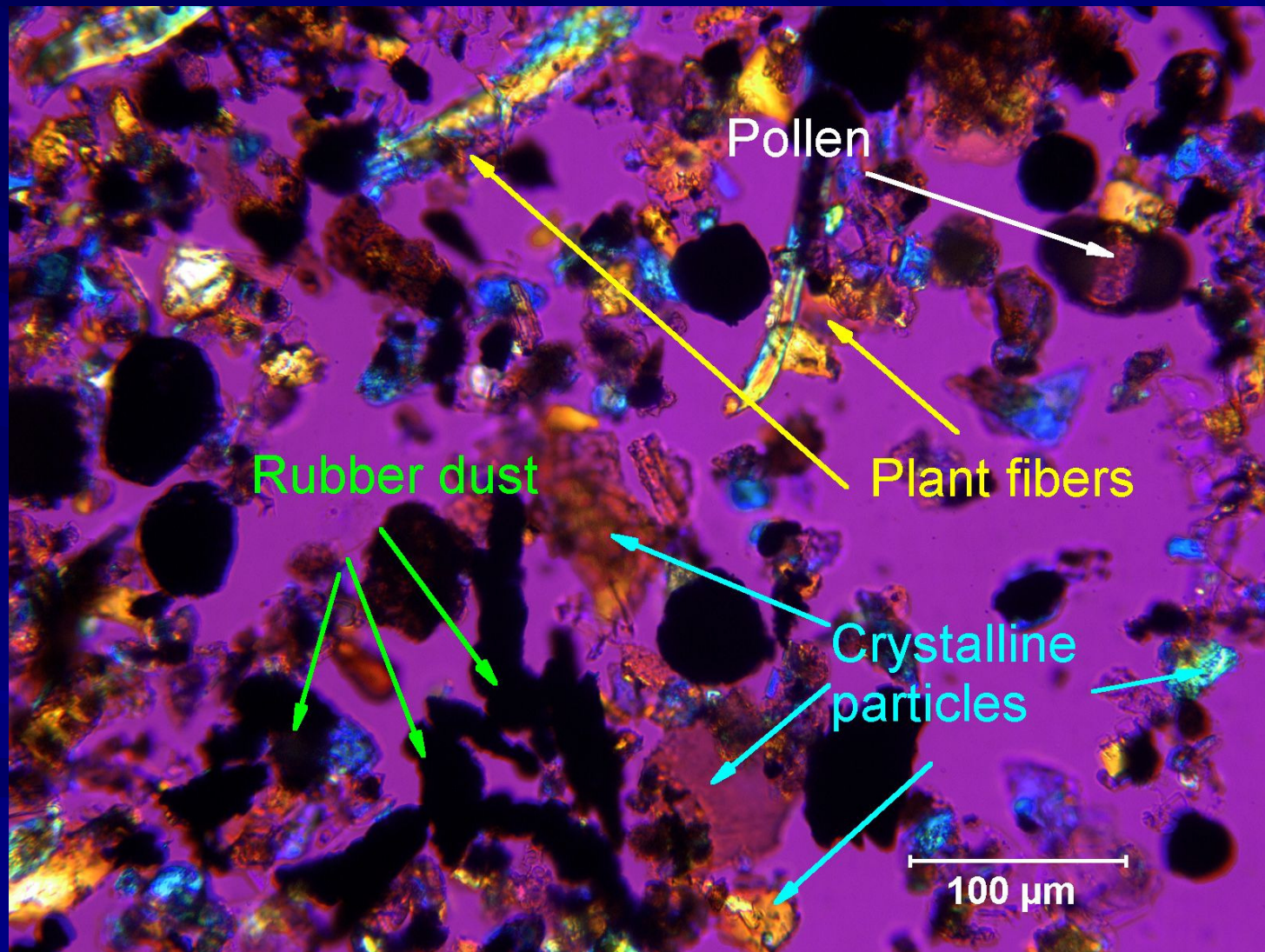
- In the South Coast Basin
  - Multiple open-pit aggregate mines
  - Construction sites
  - Concrete batch plants
  - Other industrial sources
- Glass deposition plates
  - 1-week deployment
  - At citizen's residence
  - Inexpensive sampling and microscopic analysis
  - Allows for chemical analysis if warranted
  - Not quantitative, not for PM<sub>2.5</sub>

# Typical Deposition



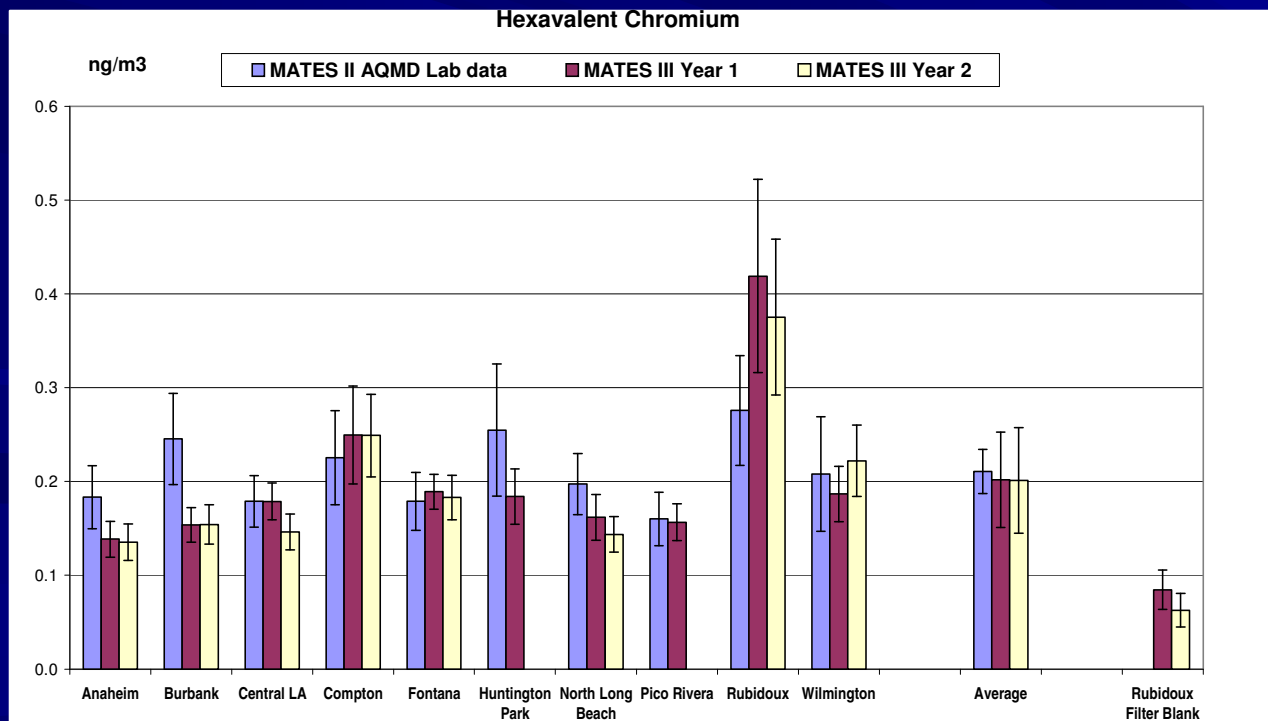


# Typical Deposition



# Hexavalent Chromium from Cement Plants

- Slightly elevated hexavalent chromium levels found 4 km from cement plants in regional air toxics study (2004-2006)



**DRAFT REPORT**  
Multiple Air Toxics Exposure Study  
In the South Coast Air Basin

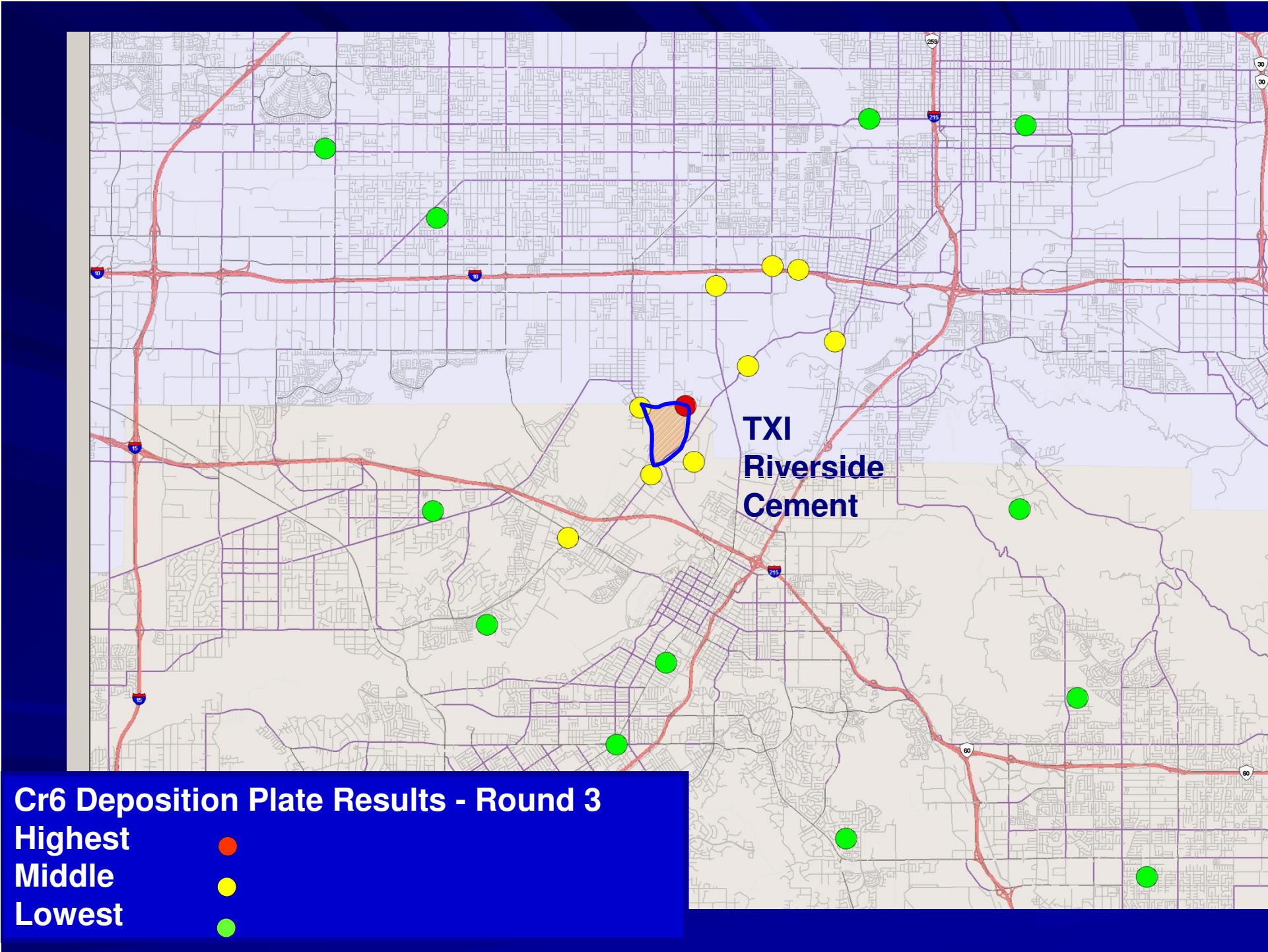
**MATES-III**  
January 2008

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

# Community-Based Deposition Plate Deployment

- Glass plates placed at residences to collect falling particles
- A good survey tool for covering a wide area
- Not used for determining true atmospheric concentrations
- Three rounds of deployment in the area
  - Jan, Feb, Mar
- All three rounds showed higher hexavalent chromium content of deposited particles near Riverside Cement



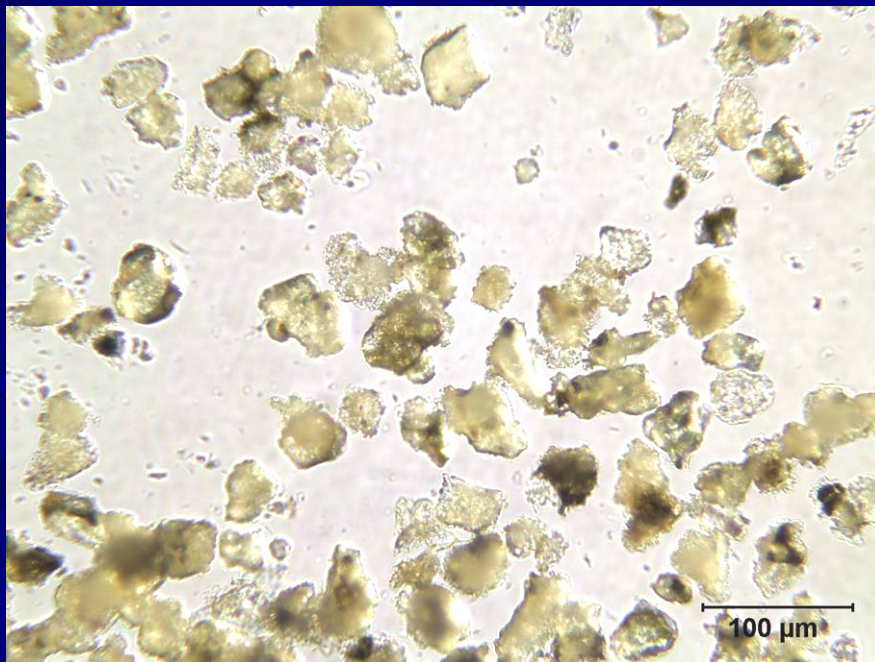




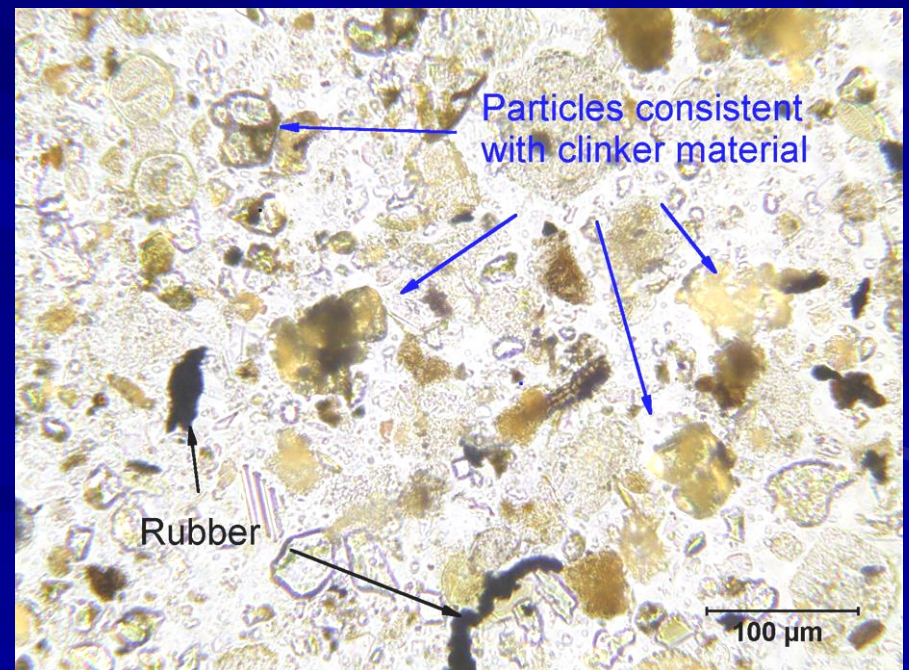
# Fingerprinting

- Microscopically examined gray clinker fine dust and particles on the deposition plates

**Gray Clinker Fine Dust**



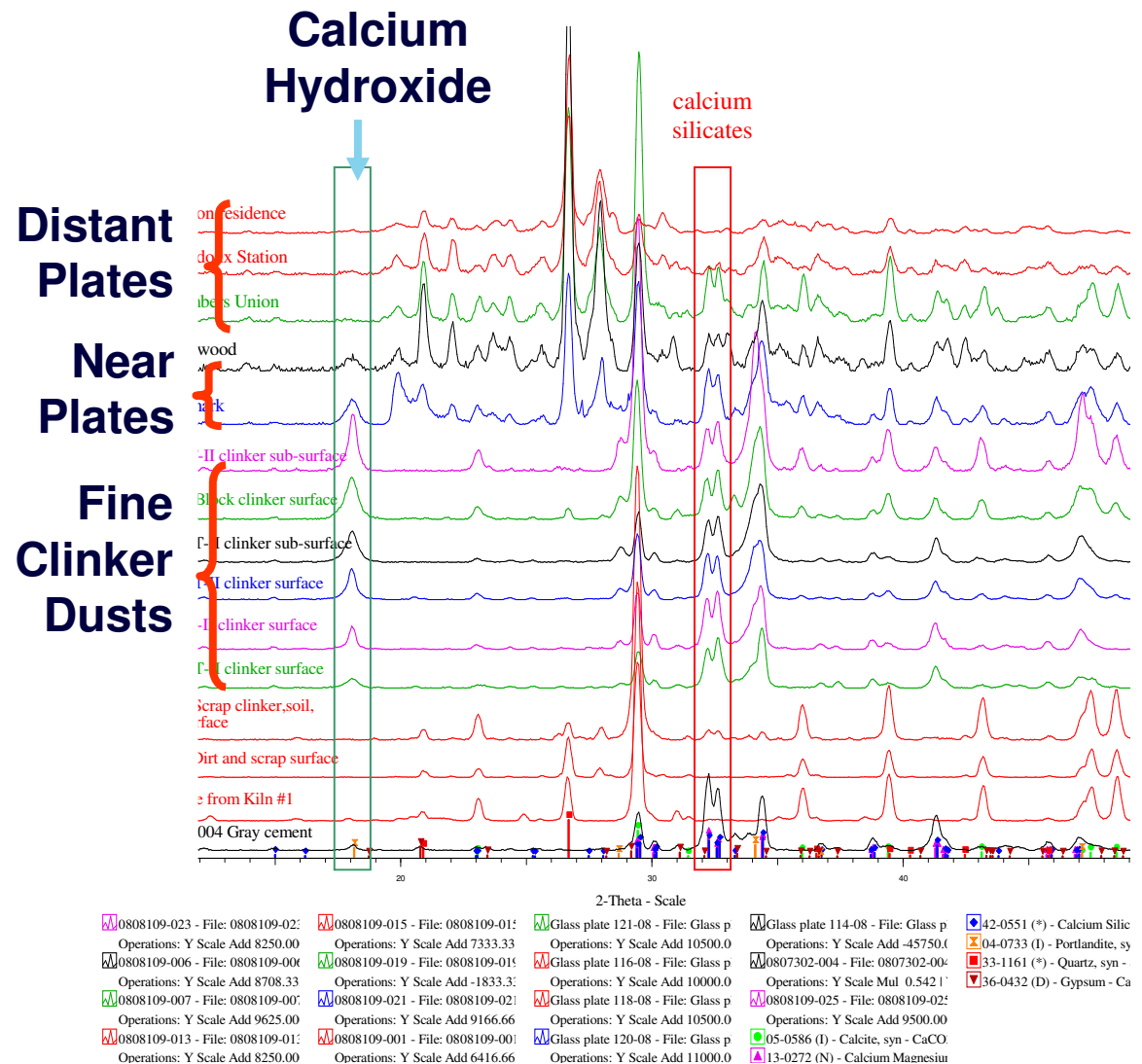
**Deposition Plate Adjacent to Riverside Cement**





# More Fingerprinting

- X-Ray Diffraction (XRD) to measure chemical composition and crystal structure
- Calcium hydroxide a marker for fine clinker dust
- Found on deposition plates nearer facility



# TXI Riverside Cement

- Established multi-site Cr6+ sampling network
- Other violations identified leading to \$1 million settlement agreement including mitigation measures
- Amended AQMD Rule 1156
  - Requires facilities to conduct fence-line Cr6+ sampling and report results to AQMD
  - Other housekeeping measures

# AQMD Wildfire Response

- **Mobile Continuous Monitors**
- **Fills gaps in PM network according to fire and smoke locations**
- **1-hour data comparable to fixed site monitors**
- **Rapidly and easily deployable units**
- **Self-contained power and telemetry**



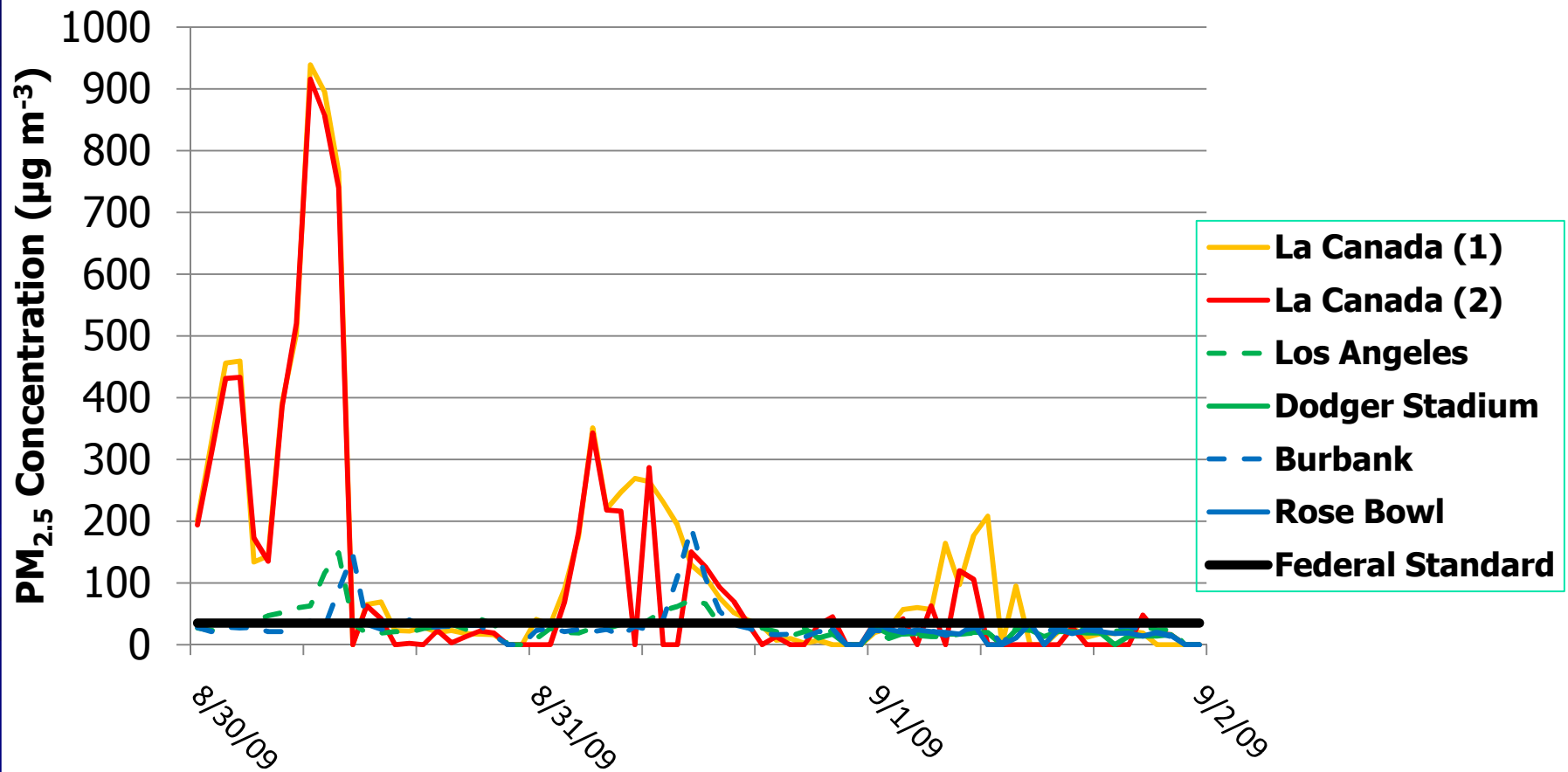
**Met One E-BAM**



# Station Fire (2009)



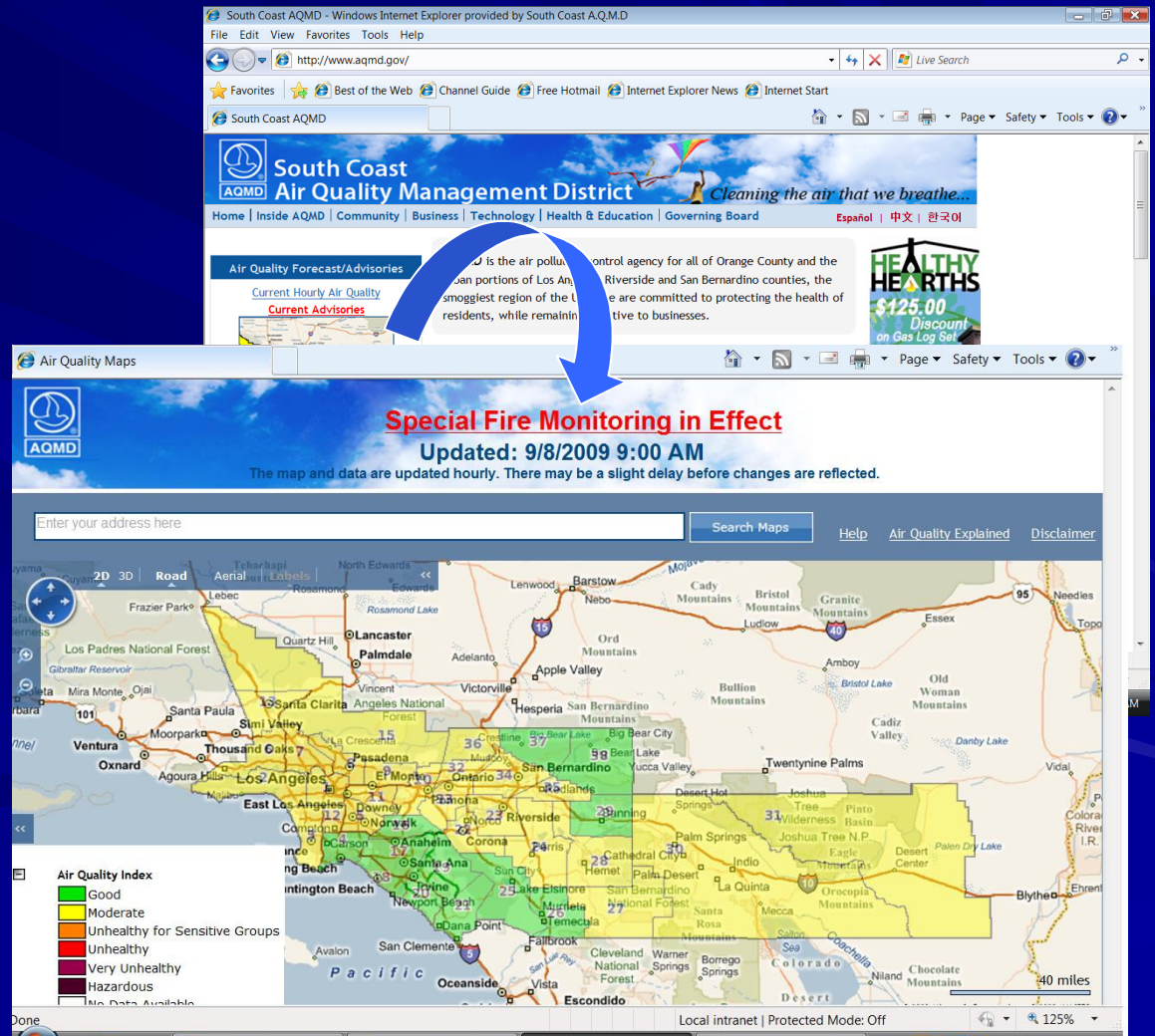
# Monitoring Data: Station Fire





# Interactive Air Quality Map

- Incorporates data from station and mobile monitors
- More responsive hourly PM data rather than moving 24-hour averages
- Color-coded to Air Quality Index



# Risk Communication Challenges

- **Odors**
  - Not necessarily toxic, possible physical response
  - Nose might be more sensitive than instruments
  - Different sensitivities, chemical mixtures
- **Putting results in context**
  - Compare to ambient averages or other locations
  - Compare to acute and chronic limits