

East Bay Diesel Exposure Project



Duyen Kauffman
Office of Environmental
Health Hazard Assessment

Presentation to the
Scientific Guidance Panel Meeting
November 9, 2017 -- Richmond, CA

Project partners and staff

- **Biomonitoring California:** Duyen Kauffman; Senior Environmental Scientist; Sara Hoover; Regan Patterson; Josephine DeGuzman; Julian Perez
- **CERCH, UC Berkeley:** Asa Bradman; Rosemary Castorina; Marina Rowen
- **University of Washington:** Chris Simpson; Michael Paulsen



Center for Environmental
Research & Children's Health

Berkeley
UNIVERSITY OF CALIFORNIA

BIOMONITORING
CALIFORNIA



W UNIVERSITY of
WASHINGTON

Project Goals

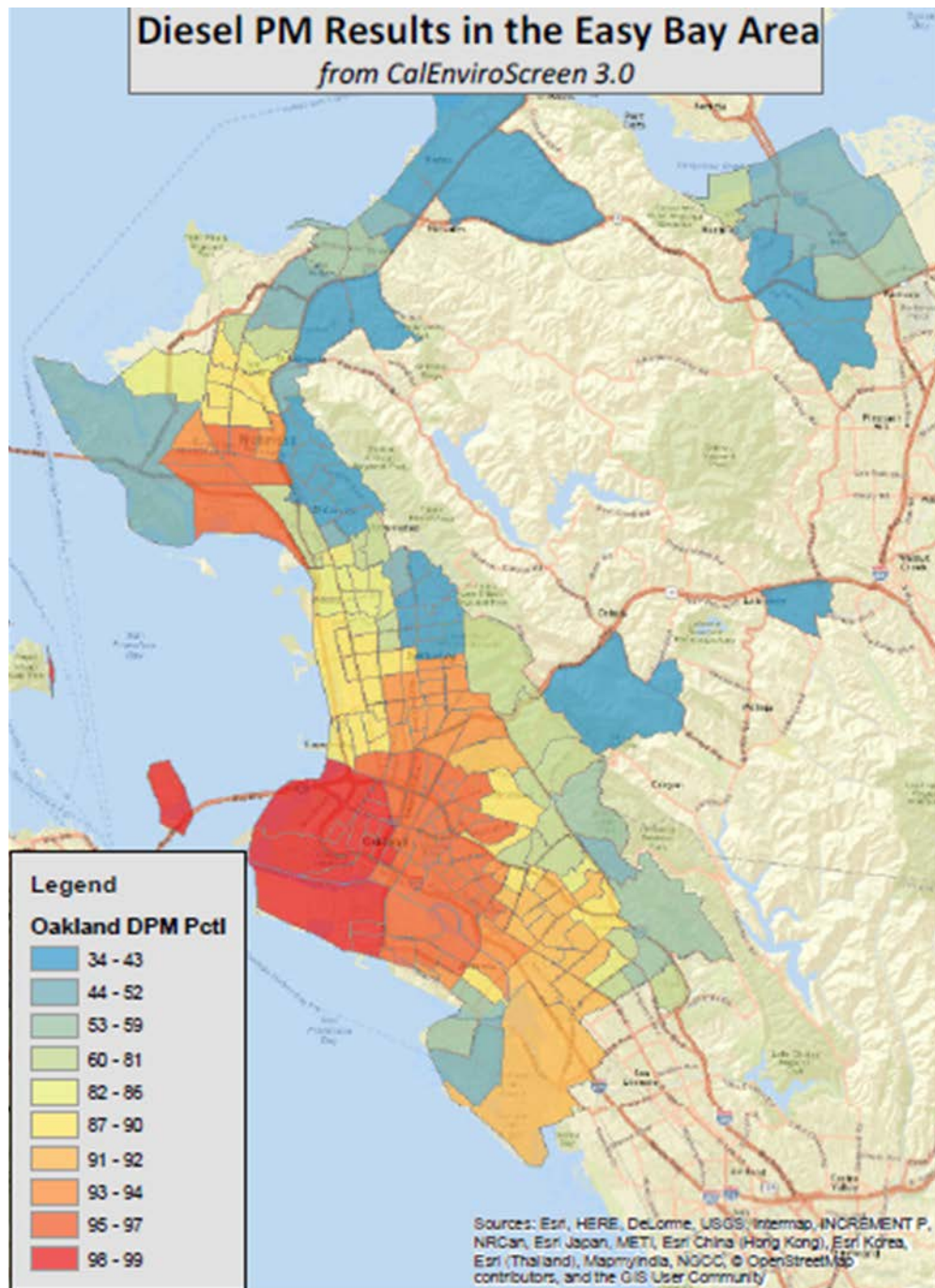
- Directly assess exposures to diesel exhaust in selected East Bay communities in the San Francisco Bay Area
- Compare levels of diesel biomarkers in child-parent pairs to increase understanding of exposure patterns within a household and across age groups
- Collect samples in winter and spring to look at seasonal differences in exposure to diesel exhaust



Project Goals, cont'd

- Further evaluate 1-nitropyrene (1-NP) as a marker for diesel exhaust exposure
- Examine the robustness of various measures of diesel exhaust exposure compared to biomonitoring results
 - CalEnviroScreen's diesel particulate matter indicator
- Generate data to help evaluate the effectiveness of California's diesel regulations





Identifying Neighborhoods

- Identify neighborhoods with a range of diesel exhaust exposure, based on:
 - CalEnviroScreen's diesel particulate matter indicator (based on data from the California Air Resources Board)
 - Diesel truck traffic patterns on nearby highways & major routes through neighborhoods
 - Local air pollution mapping (see for example, Apte et al., ES&T 2017)
- Evaluate additional stressors as factors for selecting locations
 - Housing burden and poverty indicators from CalEnviroScreen

Working with Communities

- Introduce the project to local organizations, schools, and agencies, and enlist their help with recruitment. Groups to engage include:
 - West Oakland Environmental Indicators Project
 - Schools involved in air monitoring studies
 - Breathmobile[®] sites
 - YMCA childcare centers



Basic Study Design

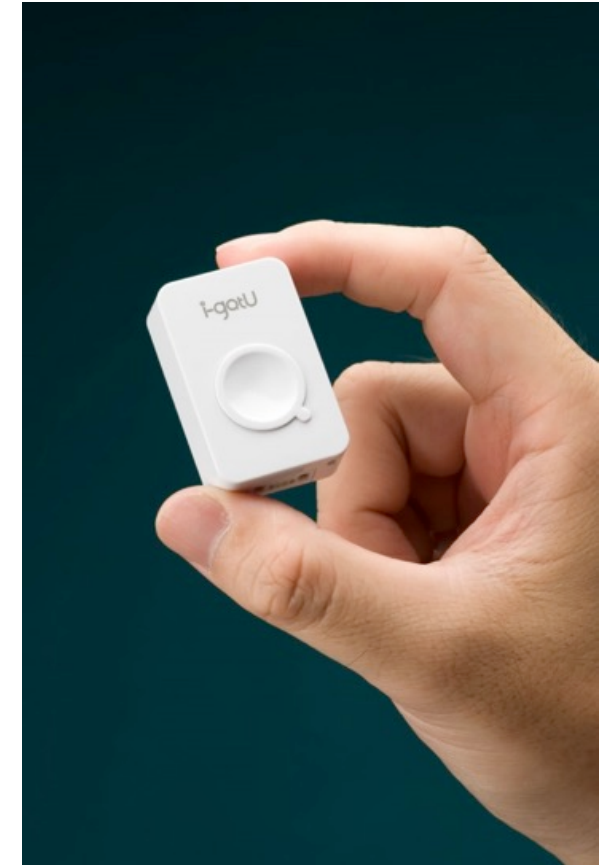
- East Bay: Oakland, Richmond, San Pablo
- Fifty child-parent pairs
 - Children 3-6 years old
- Two sampling events for each household
 - Winter 2017/2018
 - Urine, indoor air, and dust samples
 - Spring 2018
 - Urine and indoor air samples



Data Collection

Day 1 -- Home visit #1

- Exposure questionnaire
- Home walk-through
- “i-gotU” GPS data loggers for child & parent
- Activity diaries for child & parent
- Black carbon sensor
- Collection of vacuum bag for house dust sample



GPS data logger



Data Collection, cont'd

Day 4 -- Home visit #2

➤ Follow-up questionnaire

➤ Collection of:

- Activity diaries
 - GPS data loggers
 - Black carbon sensor
 - Urine samples from child & parent
-
- Subset of up to 15 families to collect daily urine samples x 4 days
 - Repeat 2 home visits in spring 2018

Time	At Home	In Transit	Diesel (DK = Don't Know)	Away from Home
12 noon	Indoor / Outdoor		Yes / No/ DK	Childcare / School / Other
1:00 pm	Indoor / Outdoor		Yes / No/ DK	Childcare / School / Other

At any time during these 24 hours, was your child near any of the following:

Fireplace	Bonfire	Trash fire	Brush fire	Gas cooking	Wood cooking	Charcoal cooking	Cigarettes	Other tobacco products
Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No	Yes / No

Excerpts from child activity diary

Laboratory Measurements

- **Urine**

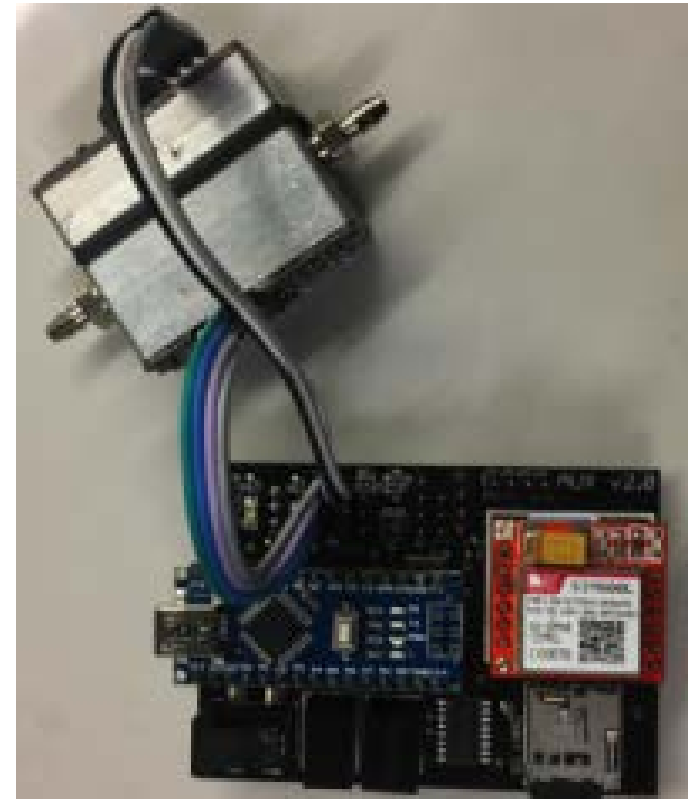
- 1-Nitropyrene metabolites
- Creatinine
- Specific gravity

- **Dust**

- 1-Nitropyrene

- **Air**

- 1-Nitropyrene
- Black carbon: Using real-time sensor developed by Thomas Kirchstetter at Lawrence Berkeley National Laboratory



Black carbon sensor

Results Return

- Return individual biomonitoring results to participants who request them
 - Informational packet: urinary results, comparison to study population, fact sheets on diesel exhaust and 1-nitropyrene
 - Support from health educator and physician
- Return separate packet of environmental sampling results, including analysis of:
 - Dust from vacuum bag
 - Filters from black carbon sensor



Other Follow Up

- Conduct community meetings to present overall study results
- Share findings
 - Post overall study results on website
 - Prepare scientific publications
- Identify ways to support exposure reduction
- Maintain relationships with community organizations



Next Steps

- Obtain official approval from both IRBs
- Launch outreach and recruitment activities with potential participants
- Begin home visits in late November/early December

NOVEMBER							DECEMBER						
M	T	W	T	F	S	S	M	T	W	T	F	S	S
		1	2	3	4	5					1	2	3
6	7	8	9	10	11	12	4	5	6	7	8	9	10
13	14	15	16	17	18	19	11	12	13	14	15	16	17
20	21	22	23	24	25	26	18	19	20	21	22	23	24
27	28	29	30				25	26	27	28	29	30	31

Questions and Discussion