Advisory Council
New Members

Jack P. Broadbent
Executive Officer/Air Pollution Control Officer
LINDA RUDOLPH
DIRECTOR OF THE CENTER OF CLIMATE CHANGE AND HEALTH, PUBLIC HEALTH INSTITUTE

- Doctorate of Medicine, University of California San Francisco
- Master of Public Health, Epidemiology, University of California Berkeley

- Previous Deputy Director for Chronic Disease Prevention and Public Health in the California Department of Public Health (CDPH)
- Previous Health Officer and Public Health Director for the City of Berkeley
- Founding Chair of the Strategic Growth Council's Health in All Policies Task Force
- Founding Chair California Climate Action Team's Public Health Work Group
- Previous Chief Medical Officer for Medi-Cal Managed Care
- Previous Medical Director for the California Division of Workers’ Compensation
GINA SOLOMON
CLINICAL PROFESSOR OF MEDICINE, UNIVERSITY OF CALIFORNIA SAN FRANCISCO
PRINCIPAL INVESTIGATOR, PUBLIC HEALTH INSTITUTE

• Serves on Environmental Protection Agency’s Board of Scientific Counselors

• Serves on National Academy of Science (NAS) Board on Environmental Studies and Toxicology

• Serves on NAS Committee on Emerging Science for Environmental Health Decisions

• Previous Senior Scientist at the Natural Resources Defense Council

• Previous Deputy Secretary for Science and Health at the California Environmental Protection Agency

• Published work includes cumulative impacts and environmental justice, new tools in toxicology, the health effects of diesel exhaust, endocrine disrupting chemicals, pesticides, refinery safety, and the health effects of climate change
Update on Assembly Bill 617 (AB 617) : Improving Neighborhood Air Quality

AGENDA: 5

AB 617: Community Health Protection Program
Program Goals

• Community Participation

• Eliminate Air Quality Disparities

• Reduce Health Burdens

• Continuous Evaluation and Improvement
AB 617 requires state to select additional communities for monitoring and/or action plans annually, beginning Oct 2019.
Community Selection

State requires districts to work with communities to select all areas in the region that have a “high cumulative exposure burden” and then prioritize areas for community monitoring and/or actions plans over the next 6 years.
Criteria for Selecting All AB 617 Areas

Community Air Risk Evaluation (CARE)
- High pollutants: fine particles, toxics, ozone
- Mortality
- Cancer risk
- ER visits and hospitalizations due to air pollution

Health and Vulnerability
- Life expectancy
- Low birth weight
- Diesel exhaust
- Traffic
- Socioeconomic factors
- Education
- Housing costs
- Access to transportation

Large Sources
- Oil refineries
- Cement plants
- Chemical plants
- Marine ports
- Airports
All Areas Recommended

- CARE Areas
- Areas with large sources
- Areas with health vulnerability and pollution impacts
- Areas with low life expectancy
Criteria to Prioritize Communities for Action

Air Quality
- Fine particles
- Toxics

Health
- Life expectancy
- Lung disease
- Heart disease

Other
- Resources
- Data
- Planning
- Collaboration
- Capacity
Community Priorities

- West Marin, due to concerns over woodsmoke
- West Oakland
- Richmond
- Pittsburg-Bay Point area
- Vallejo
- East San Francisco
Community Recommendations

Year 1

West Oakland – action plan

Richmond - monitoring

Year 1
Years 2-5
West Oakland

- Very high mobile source emissions
  - Port of Oakland largest single source of diesel particulate matter (diesel PM)
  - Roadways contribute significantly to PM$_{2.5}$
- High health burden
- High socio-economic vulnerability

- Concerns about new development at Port of Oakland and Oakland Army Base
- Goal of zero emissions environment
- Leverage previous and ongoing collaboration and research
Action Plan Components

• Local air quality conditions and impacts
• Emission reduction targets
• Stationary and mobile sources
• Source apportionment
• Exposure reduction strategies
• Implementation schedule
• Enforcement plan
• Method for tracking progress
Richmond

• High emissions from stationary and mobile sources:
  o Refinery, chemical plant, landfills, water treatment facility, metal scrapping, marine terminals, freeways, port
• High health burden
• High socio-economic vulnerability

• Regional monitoring data are not consistent with observed health issues
• More monitoring to evaluate which sources may be contributing to issues
• Leverage ongoing data analysis and monitoring work
Monitoring Plans

• Engage local community and key stakeholders
• Develop shared concerns and air monitoring objectives
  o Identify potential issues
  o Determine contributing sources
• Use a combination of monitoring methods
• Collected data will be publicly available
• Analyze and interpret data and communicate results
Emissions Inventory

• Annual stationary source emissions reporting for facilities:
  o already subject to mandatory GHG reporting
  o emit 250 tons/year or more of any nonattainment pollutant/precursor
  o has an “elevated prioritization score” based on cancer or noncancer impacts
Emissions Inventory (continued)

• Uniform statewide annual reporting for criteria and toxic emissions

• Air District intends to continue requiring reporting, but will work with CARB, CAPCOA, and industry to develop uniform methods
Updated Pollution Control Standards and Technology

• Non-attainment pollutants

• Determine Best Available Retrofit Control Technology

• Coordinate with state and other districts
Updated Pollution Control Standards and Technology (continued)

• Adopt BARCT implementation schedule
  o include Cap & Trade sources
  o consider:
    - benefits to local community
    - cost effectiveness
    - air quality attainment benefits
  o deadline December 31, 2023
What’s Next?

• Action Plan in West Oakland
• Monitoring in Richmond
• New rules and regulations
• Provide incentives for cleaner vehicles
• Build capacity and relationships
Questions?

Greg Nudd
Deputy Air Pollution Control Officer
gnudd@baaqmd.gov
Diesel Particulate Matter (Diesel PM) Health Impacts and Impacted Areas

Advisory Council Meeting
July 19, 2018

Judith Cutino, DO, PE, Health Officer
Virginia Lau, Advanced Projects Advisor
Overview

- Fine particles can penetrate deep into the lungs causing cardiovascular and pulmonary health impacts
- Health effect studies have shown that diesel particulate matter (diesel PM) is a potent carcinogen
- Bay Area studies show diesel PM remains a significant contributor to regional cancer risk from air pollution
- Diesel PM from mobile sources contributes a majority of the risk to vulnerable, impacted areas
Diesel PM

• Major sources include heavy-duty trucks, trains, ships, and large generators

• Composed of carbon particles, inorganic solids, and over 40 known toxic air contaminants (TACs) including
  - Polycyclic aromatic hydrocarbons
  - Benzene
  - Formaldehyde
  - Acetaldehyde
  - Acrolein
  - 1,3-Butadiene
Health Effects of Diesel PM

• Exposure contributes to non-cancer health effects, including:
  ➢ Premature death
  ➢ Increased risk of heart disease and stroke
  ➢ Respiratory disease, such as asthma
  ➢ Decreased lung function in children
Studies of PM

• Harvard School of Public Health studies of Medicare patients:
  - Higher estimated risk of death from PM$_{2.5}$ exposure
  - At concentrations below the current NAAQS
  - Higher effects for racial minorities, low socioeconomic status

• Numerous health studies show:
  - Increased health effects for those living near major sources of diesel PM
  - Example: higher new-onset asthma in children living near roadways
Diesel PM Identified as Carcinogen

• California Air Resources Board identified diesel PM as a Toxic Air Contaminant:
  ➢ Cal EPA Office of Environmental Health Hazard Assessment (OEHHA) evaluation of diesel exhaust (1998)

• World Health Organization – International Agency for Research on Cancer classified diesel engine exhaust as carcinogen:
  ➢ Lung cancer
  ➢ Possible increased risk of bladder cancer
Who is Affected?

- Higher diesel PM near vulnerable Bay Area residents with low income and high cumulative health burden:
  - Disproportionately affecting people of color

- Those most vulnerable to health effects:
  - Children
  - Pregnant women
  - Elderly
Impacted Areas

• Highly populated, urban core, residential areas have higher exposure to diesel PM

• Community Air Risk Evaluation (CARE) Program and the new Community Health Protection Program are identifying these areas using emissions data, health outcome results, and air quality modeling
### Diesel PM Contributes to PM$_{2.5}$ and Black Carbon (BC)

#### REGIONAL EMISSIONS INVENTORY

<table>
<thead>
<tr>
<th>Description</th>
<th>DPM/PM2.5 Fraction</th>
<th>DPM/BC Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014 Bay Area Emissions Inventory</td>
<td>14%</td>
<td>30%</td>
</tr>
</tbody>
</table>

#### MONITORED DATA (2009-2010)

<table>
<thead>
<tr>
<th>City</th>
<th>Annual DPM/PM2.5 Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Jose</td>
<td>12%</td>
</tr>
<tr>
<td>West Oakland</td>
<td>13%</td>
</tr>
</tbody>
</table>
Diesel PM is Regional Pollutant

Lifetime Cancer Risk Based on Air Monitoring Data

<table>
<thead>
<tr>
<th>Year</th>
<th>Cancer Risk (per million, 70 year exposure)</th>
<th>PM Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>4,100 in a million</td>
<td>72%</td>
</tr>
<tr>
<td>2001</td>
<td>1,800 in a million</td>
<td>74%</td>
</tr>
<tr>
<td>2014</td>
<td>690 in a million</td>
<td>65%</td>
</tr>
</tbody>
</table>

- **diesel PM**
- **benzene**
- **1,3-butadiene**
- **Others**
Diesel PM from Mobile Sources is Primary Risk Driver

Cancer-Risk Weighted Emission Estimates by TAC, 2015

- Diesel Particulate Matter: 82%
- 1,3-Butadiene: 5%
- Benzene: 3%
- Other: 4%
- Formaldehyde: 1%

Cancer-Risk Weighted TAC Emissions by Source Category, 2015

- Ships and Commercial Boats: 19%
- Construction Equipment: 30%
- On-Road Mobile Sources: 24%
- Industrial and Commercial Equipment: 6%
- Other: 10%
- Aircraft: 3%
- Trains: 3%
- Transportation Refrigeration Units: 2%
- Farm Equipment: 3%
Regional and Localized Impacts
CARE Program

- Evaluate regional and community health impacts from outdoor air pollution
- Identify sensitive populations
- Develop strategy for reducing risks in locations with higher impacts and sensitive populations
Overall Air Pollution Down, but Higher Risks in Some Communities

2005 – Cancer Risk

2015 – Cancer Risk

Cancer Risk from:
- Diesel PM
- 1,3 - butadiene
- Benzene
- Formaldehyde
- Acetaldehyde

Cancer Risk
- 0 – 300
- 300 – 500
- 500 – 800
- 800 – 1100
- > 1100

0 – 300
- 300 – 500
- 500 – 800
- 800 – 1100
- > 1100

Kilometers

1 km x 1 km grid
Vulnerable Populations

Vulnerable populations:
- Based on health records and predicted health outcome
- Proximity to high emission sources

Outcome:
- Disproportionate health impact along transportation corridors and near high emission sources
Sources of Fine Particles in SF

2014 – Cars and Trucks

2014 – Combined Sources
• Cancer risk in West Oakland was three times higher than Bay Area average in 2005
• Central air monitoring sites shows similar concentrations to other urban areas, but concentrations are higher near major roads and at the Port
• The drayage truck rule, in combination with enforcement efforts and grants, reduced risks from Port trucks by about 70%
Key Findings

• Diesel PM is still the main contributor to cancer risk from toxic air contaminants

• Diesel PM, especially from mobile sources, is still an important contributor to health risk in impacted areas

• Fine PM of all types is linked to poor health outcomes and mortality

• Diesel PM is a significant source of black carbon, a climate forcing pollutant known to cause the same health effects as PM$_{2.5}$
Key Findings (continued)

• Grants, regulatory programs, and enforcement efforts have resulted in significant reductions in diesel PM

• More reductions in diesel PM are needed to prevent back sliding and to accelerate air quality improvements in impacted areas
Update on Air District’s Diesel Particulate Matter (Diesel PM) Emissions Reduction Strategy

Advisory Council Meeting
July 19, 2018

Damian Breen
Deputy Air Pollution Control Officer
Diesel PM Reduction Strategy

• Why Diesel PM?
• ARB Regulatory Efforts
• Air District Strategy:
  ➢ Compliance and Enforcement
  ➢ Regulations and Permitting
  ➢ Monitoring
  ➢ Planning and CEQA guidance
  ➢ AB 617 Community Air Protection Program
  ➢ Grants
  ➢ Voluntary Emissions Reductions
• Technology Solutions
• Commitments by Others
• Request for Input and Support
Why Diesel Particulate Matter (Diesel PM)?

- Diesel PM significant driver of health risk in many Bay Area communities
- Contributes to Black Carbon Emissions
New ARB Freight Rules

- **2018**
  - ZE Truck Certification
  - ZE TRUs
  - ZE Local Trucks
  - ZE Ships at Berth
  - Lower Truck In-use Emissions
  - Truck GHG
  - Truck OBD

- **2019**
  - ZE Forklifts
  - Railyard Idling
  - Low NOx Trucks
  - Harbor Craft
  - Handbook 1, Warehouses

- **2020**
  - 2021
  - Handbook, 2 Ports, Rail
  - Low-emission Diesel Fuel
  - Non-preempted Locomotives

- **2022**
  - ZE Drayage Trucks
  - ZE Cargo Equipment
Diesel PM Strategy – Compliance & Enforcement

• Stationary Source Inspection
• Drayage Trucks
• Idling Commercial Trucks/Buses
• Terminal Idling limits at Ports
• Ocean-Going Vessels at Berth
• Fuel Sulfur Limits for Ocean-Going Vessels
• Commercial Harbor Craft
• Portable Equipment
• Construction Equipment
• Transportation Refrigeration Units (TRUs)
• Mobile Cargo Handling Equipment
Diesel PM Strategy – Regulation and Permitting

**Air District Rules and Regulations**
- Regulation 2-5: New Source Review of Toxic Air Contaminants
- Regulation 6-1: Particulate Matter – Ringelmann Standard, “visible emissions”
- Regulation 9-8: NOx and CO from Stationary Internal Combustion Engines
- Regulation 11-18: Reduction of Risk from Air Toxic Emissions at Existing Facilities

**State Regulations**
- Airborne Toxic Control Measure (ATCM) for Stationary Diesel Engines
- ATCM for Portable Diesel Engines

**Federal Regulations**
- New Source Performance Standards (NSPS), Subpart IIII
- National Emission Standards for Hazardous Air Pollutants (NESHAP), Subpart ZZZZ
Diesel PM Strategy – Monitoring

Historic
• 2009/10 – West Oakland - Black Carbon, PM, Organic Carbon, BETX, Metals, Nitrogen Oxides

Current
• 4 Near Roadway Monitors – PM, Black Carbon, Gaseous TACs, Nitrogen Oxides, Ultra Fine Particulates
• Black Carbon Monitoring - West Oakland, Livermore, Forest Knolls
• Partnership UC Berkeley
  ➢ Caldecott Tunnel - gas and diesel plume studies (since 1990s)
  ➢ Port of Oakland - drayage truck plume studies (since 2000s)

Upcoming
• AB 617
  ➢ Richmond – Based on Community Consultation
  ➢ Future Communities
Diesel PM Strategy – Planning and CEQA

Guidance Documents:

• 2016 - Planning Healthy Places
  ➢ Emissions reductions strategies
  ➢ Best practices for reducing exposure

• 2017 – California Environmental Quality Act (CEQA)
  Air Quality Guidelines
  ➢ Thresholds for localized exposure
  ➢ Recommended mitigation actions
• AB 617 analysis shows disproportionate health impacts along transportation corridors and near high emission sources
• Diesel PM is a contributing factor to health impacts in every community
• West Oakland Community has been selected to move directly to a community emissions reductions program
• Diesel PM reductions to be a significant component of West Oakland Program
• AB 617 Grant funds currently targeted at Diesel PM reductions
Diesel PM Strategy – Grants

Key:
- **TFCA** – Transportation Fund for Clean Air
- **MSIF** – Mobile Source Incentive Fund
- **CMP** – Carl Moyer Program
- **Other** – Other federal, state, and settlement funds
- **VW** – Volkswagen NOx Mitigation Funds
- **AB 617/134** – Community Air Protection Program

<table>
<thead>
<tr>
<th>Source</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFCA</td>
<td>$25M</td>
</tr>
<tr>
<td>MSIF</td>
<td>$13M</td>
</tr>
<tr>
<td>CMP</td>
<td>$9M</td>
</tr>
<tr>
<td>Other</td>
<td>$5M</td>
</tr>
<tr>
<td>AB 617 / 134</td>
<td>$50 M</td>
</tr>
<tr>
<td>Volkswagen NOx Mitigation*</td>
<td>$30 M</td>
</tr>
</tbody>
</table>

Total Funds Available = ~$132M
Diesel PM Strategy – Voluntary Emissions Reductions

Mayors, city and county governments, industry and business leaders will adopt innovative solutions to eliminate diesel emissions and black carbon from communities:

• Collaborate and coordinate on ordinances, policies, and procurement practices that will reduce diesel emissions to zero within their jurisdictions, communities or companies;

• Share and promote effective financing mechanisms domestically and internationally to the extent feasible that allow for the purchase of zero emissions equipment;
• Share information and assessments regarding zero emissions technology;

• Build capacity for action and technology adaptation through technology transfer and sharing expertise; and

• Use policies and incentives that assist the private sector as it moves to diesel-free fleets and buildings.

• Periodic reporting to all signers of progress towards the zero-diesel emissions goal.
Technology Assessment – Trends for Batteries

![Graph showing the average battery pack price from 2010 to 2030 with a projection for 2030. The graph indicates a significant decrease in price over time, with a sharp decline from 2010 to 2016, and a gradual decrease thereafter.]

"Between 2020 and 2030, EVs will become cheaper to own than ICE cars on an unsubsidized basis."

-Bloomberg
## Technology Assessment

<table>
<thead>
<tr>
<th>Technology Readiness Level</th>
<th>Vehicle / Equipment Category</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commercially Available</strong></td>
<td>Light-duty cars/SUVS&lt;br&gt;Buses&lt;br&gt;Cargo handling equipment&lt;br&gt;Locomotives - switchers/yard goats&lt;br&gt;Ocean going vessels (at berth)&lt;br&gt;Transportation refrigeration units&lt;br&gt;Medium-duty trucks&lt;br&gt;Batteries for emergency or backup power (~5kW or shorter load durations)&lt;br&gt;Fuel cell systems for emergency or backup power (~5-20kW)</td>
</tr>
<tr>
<td><strong>Early Commercialization</strong></td>
<td>Small construction equipment&lt;br&gt;Batteries for emergency or backup power (&gt;5kW)</td>
</tr>
<tr>
<td><strong>Demonstration</strong></td>
<td>Heavy-duty trucks&lt;br&gt;Cargo handling equipment (container top/side picks)</td>
</tr>
<tr>
<td><strong>Not Yet Available</strong></td>
<td>Commercial harbor craft&lt;br&gt;Large construction equipment&lt;br&gt;Locomotive - line haul&lt;br&gt;Ocean going vessels (at sea)</td>
</tr>
</tbody>
</table>
Commitments on Diesel PM to reduce petroleum/diesel

Legend:

Country/regional, ban sales of gasoline/diesel vehicles
- Blue: By 2025
- Blue: By 2040
- Green: By 2030
- Purple: TBD

Country/regional, all zero emission vehicles
- Red: By 2050

State, reduce petroleum consumption by 50%
- Orange: By 2030

City, diesel vehicle ban
- Red: 2018-2025

C40 cities with pledges for zero emissions
- Purple: By 2030
Request for Input & Support

• What are we missing?

Request for Support:

• Provide input to the Air District’s Board of Directors in support of voluntary diesel emissions reduction efforts.