AGENDA ITEM 3

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

# Particulate Matter Rules Update
# BAAQMD – BACWA Meeting

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Rule Development
June 21, 2017

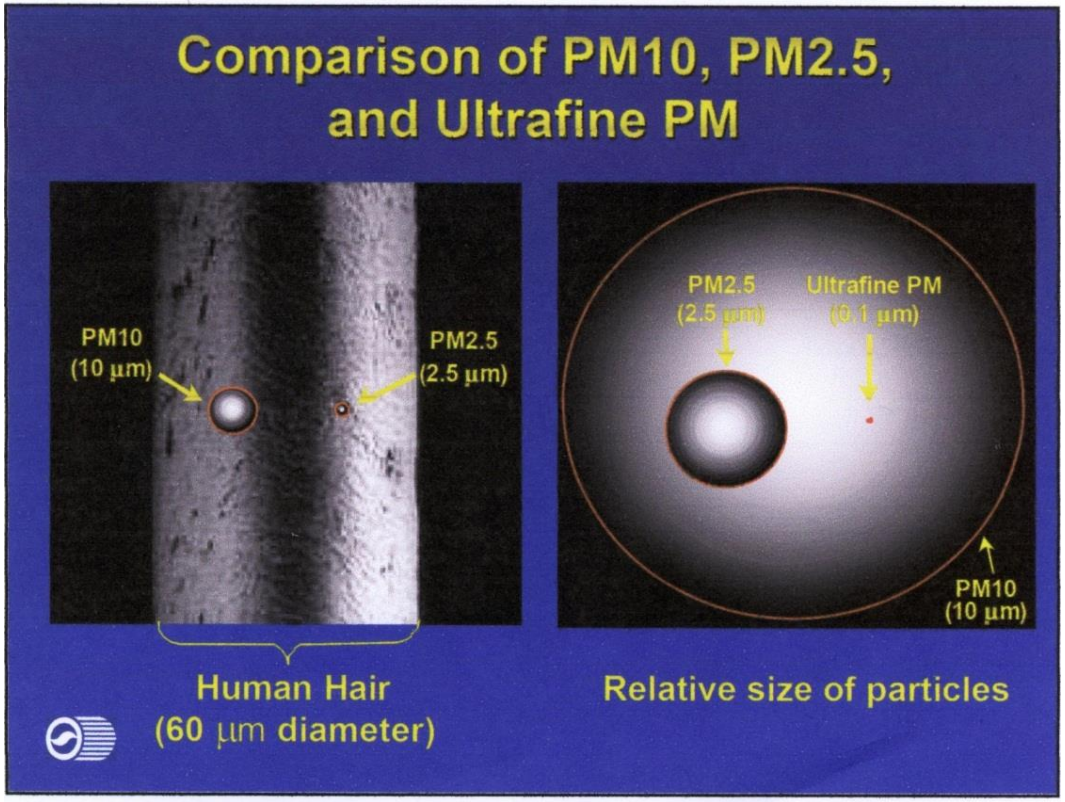
# PM Basics

Particulate Matter is a diverse mix of airborne solid particles and liquid droplets that differ in size, mass, toxicity, chemical properties & how they behave in the atmosphere

- **Total Suspended Solids (TSP)**: ~50 microns or less
- **$PM_{10}$**: 10 microns or less*
- **$PM_{2.5}$**: "Fine" PM 2.5 microns or less*
- **Ultrafine PM**: 0.1 microns or less*

Smallest particles have the greatest health impacts!

* One *million microns = one meter*



# PM Sources

Wide range of emissions sources: natural and human-made

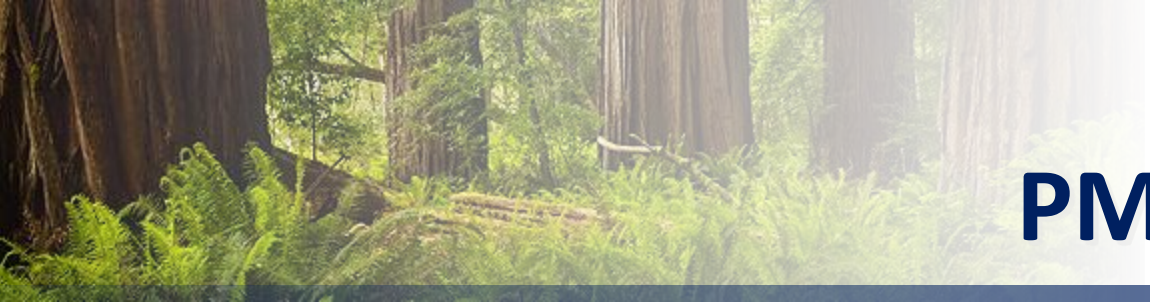
- Primary PM: emitted directly from tailpipes, stacks, windblown dust, etc.
  - Both solids and small liquid droplets (called aerosols)
- Some pollutants emitted as a gas, then condense (called condensable PM)
- Secondary PM formed in the atmosphere: Precursor pollutants are ROG, $NO_x$, $SO_x$, $NH_3$

PM levels vary both geographically and with the weather

- Highest Bay Area $PM_{10}$ + $PM_{2.5}$ levels occur during fall – from wild fires
- Highest Bay Area $PM_{2.5}$ levels occur during winter – from wood burning

Information on condensable particulates still improving

- Test method to quantify condensable particulates was finalized December 2010
- Using this test method on sources with high potential for condensable PM
  - refinery FCC's and cement kilns
  - Waste water treating plants?



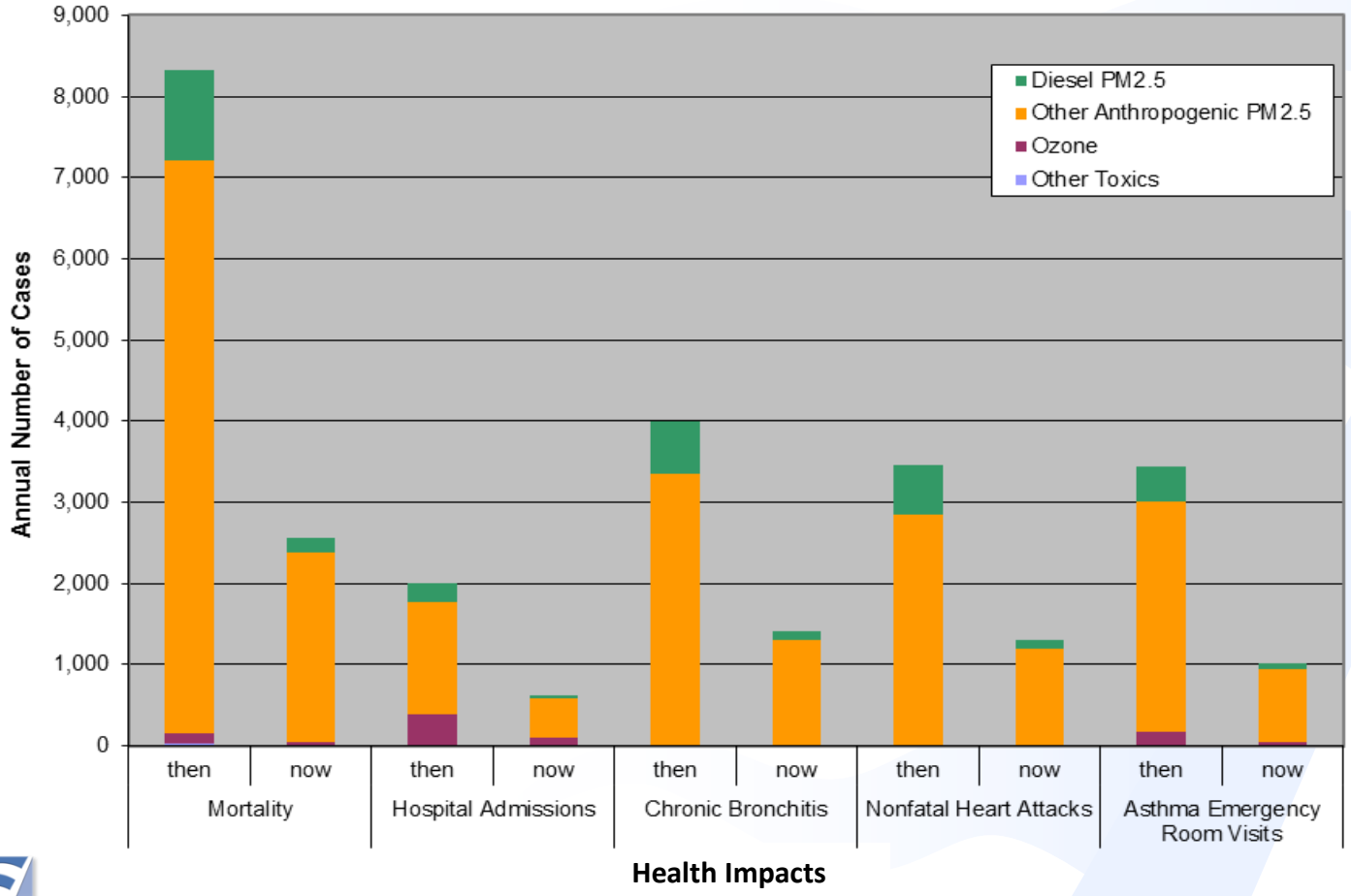
# PM Health Impacts

- Premature mortality
  - Higher $PM_{2.5}$ levels → higher death rates
    $PM_{2.5}$ accounts for 2,000-3,000 premature deaths each year in the Bay Area
- Respiratory problems
  - asthma, bronchitis, impaired lung development
- Cardiovascular problems
  - atherosclerosis, heart attacks, strokes
- Cancer
  - diesel soot contains carcinogens

- Adverse health impacts even at moderate levels
  - from both short-term & long-term exposure
  - children & elderly are most at risk
  - small particles penetrate deep into lungs, bloodstream, organs, and cells

# Estimated PM Health Burden in Bay Area

## Health Burden: Past and Present

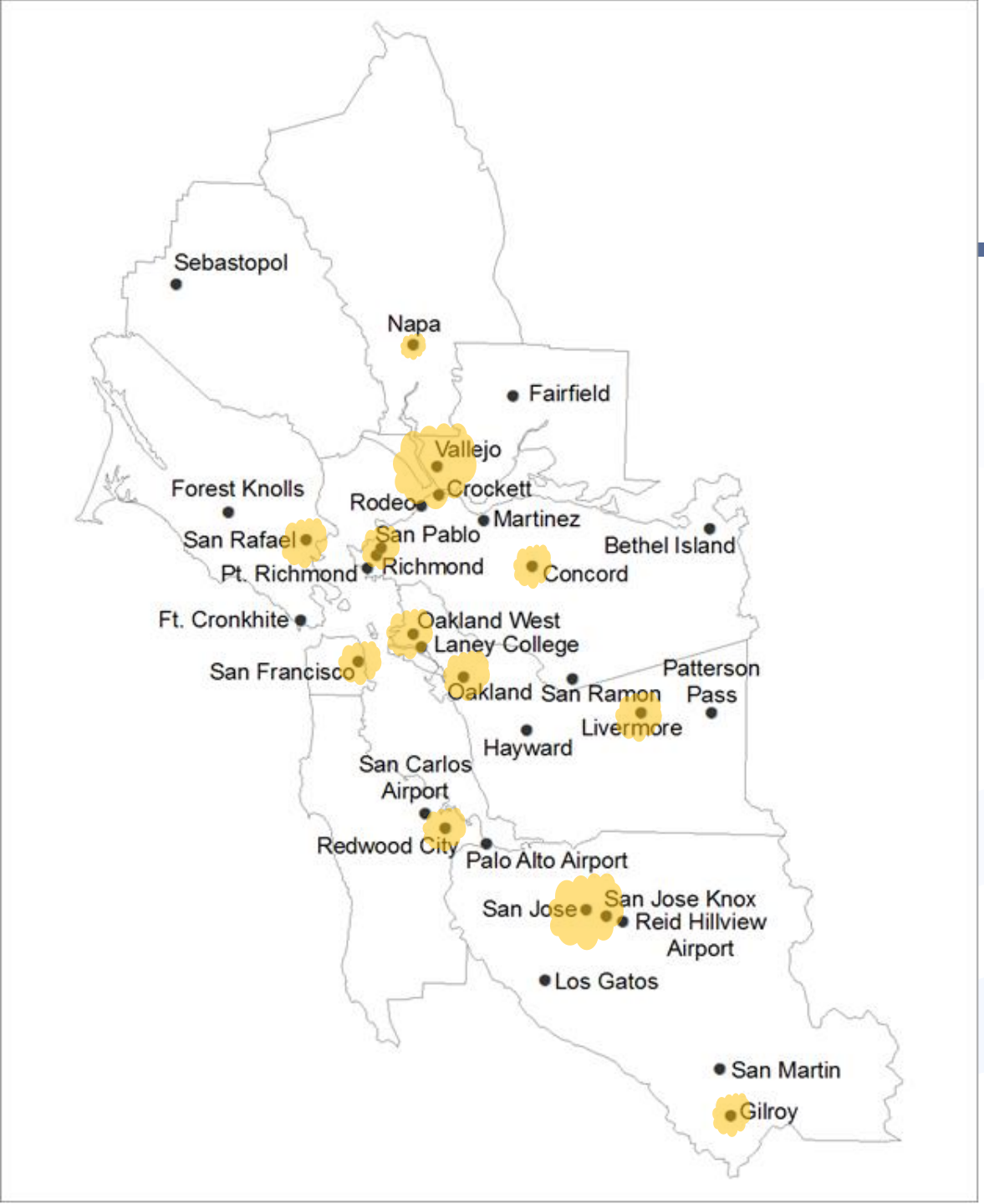



Then = 1970's for ozone, 1980's for toxics and PM

Now = 2015

Source: Figure C-1, 2017 Plan Appendix C – Air Pollution Health Burden: Past & Present

# High $PM_{2.5}$ Locations

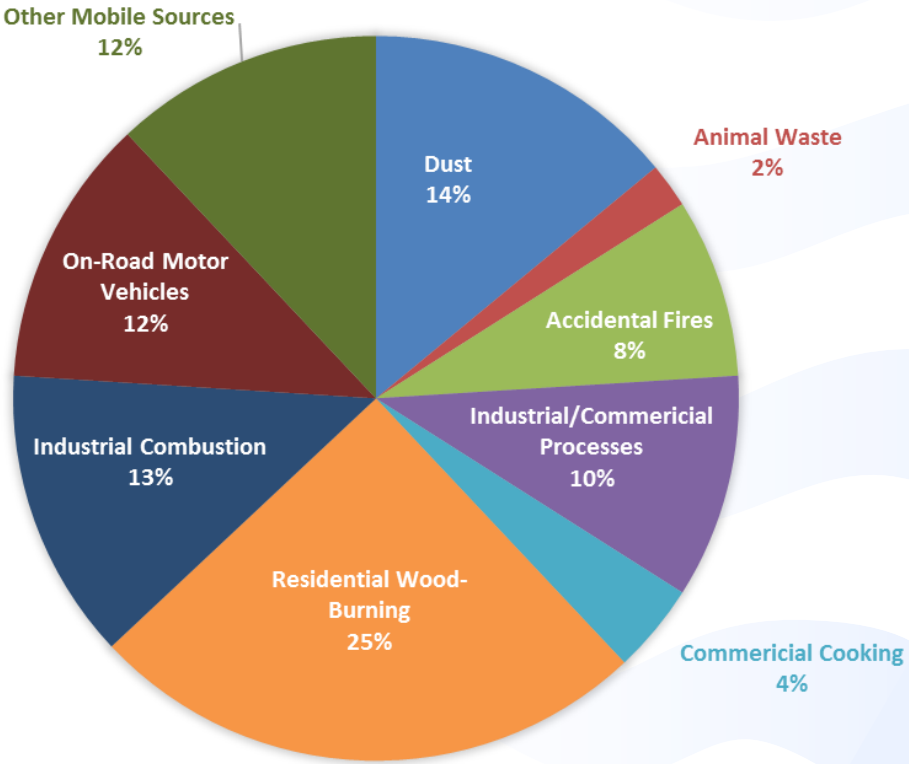



**2011 - 2016**
**$PM_{2.5}$ Daily Exceedances**

| | |
|---|---|
| Vallejo | 17 |
| San Jose | 15 |
| Livermore | 7 |
| Oakland East | 7 |
| Oakland West | 6 |
| San Rafael | 6 |
| San Francisco | 5 |
| Redwood City | 4 |
| Concord | 3 |
| San Pablo | 3 |
| Gilroy | 3 |
| Napa | 2 |
| **Total** | **80** |
| | |
| Winter | 73 |
| Wildfires | 7 |

# Sources of $PM_{2.5}$

**2017 Clean Air Plan Figure 2-6: Direct $PM_{2.5}$ Emissions by Source, Annual Average, 2015 (47 tons/day)**



# Air Quality Trends

## 24-hr $PM_{2.5}$ Exceedances each Winter

# Draft Structure for Regulation 6

- Amendments to Regulation 6, Rule 1:  General Requirements
- New Regulation 6, Rule 6: Prohibition of Trackout
- New Regulation 6, Rule 8: Bulk Material Handling
- Anticipate other source specific rules going forward

# Regulation 6, Rule 1: General Requirements

## Rule 6-1 is currently a Total Suspended Particulates (TSP) rule (includes $PM_{10}$ and $PM_{2.5}$)

### Proposed changes to Rule 6-1

- Continue exemption for process heaters / boilers
  - Combustion is a significant source, but no technology to prevent or control
- Limits apply to sources with significant TSP emissions (> 6 lbs. per day)
  - Most waste water treating sources emit less than 6 lbs. per day
- Tighten general particulate matter emissions limits
  - concentration and mass limits to match the most stringent requirements in California
  - translation of TSP to $PM_{10}$ and/or $PM_{2.5}$ requirements is dependent on the specific solids
- Specify test methods for determining compliance
- Require periodic compliance testing

# Prohibition of Trackout

## New Regulation 6, Rule 6: Prohibition of Trackout

- Trackout = solids "tracked out" onto adjacent roads by vehicles
- Road dust from trackout has high $PM_{2.5}$ content
- Staff observed that more than 50% of construction sites had trackout issues.
- Currently required by many city / county ordinances, Storm Water Pollution Prevention Plans and California Motor Vehicle Code, but enforcement seems inadequate.
- Requirements
  - No "significant" visible emissions
  - No "significant" visible roadway material on adjacent paved roadway
    - Immediate cleanup required (with no visible emissions) and no material at end of work day
  - Regular monitoring

Truck traffic in / out of waste water treating plants?

# Examples of Road Dust - Trackout

From trucks


Soil Erosion

# Examples of Trackout Controls

Grizzlies


Truck wash system

## New Regulation 6, Rule 8: Bulk Material Handling

- Addresses fugitive dust from all bulk materials, including petroleum coke and coal.
- Best Available Control Technology: cover transportation vehicles, and enclosures around handling, loading, and unloading – ducted to a baghouse.
- Requirements
  - No Visible Emissions
  - Wind screens and water-mist systems for existing facilities
  - Load using telescoping chutes, limit drop height and freeboard to no more than 5 feet

Again – does waste water treating have much solids handling?

# Examples of Bulk Material Dust

Quarry

Petroleum Coke

# Bulk Material Dust Controls

Wind Screens

Mist Systems

# Rule Making Schedule

## Workshops:

- Eight workshops in late January / early February
  - Cupertino
  - San Rafael
  - Walnut Creek
  - San Jose
  - San Francisco
  - Yountville
  - Dublin
  - Oakland
- Comments received by March 10

## Public Hearing:

- Incorporate changes in Summer
- CEQA and Socio-economic analyses by Fall
- Public Hearing(s?) in Winter, 2017

# Next Steps for PM

- Follow through on Combustion Strategy in 2017 CAP to minimize combustion particulates / reduce fuel consumption
- Reduce refinery Fluidized Catalytic Cracking Unit $PM_{2.5}$ emissions
  - Possible amendments to Rule 6-5
- Address $PM_{2.5}$ emissions from cement kiln
- Evaluate PM risk as part of proposed Rule 11-18 Health Risk Assessment (HRA's)
- Future source specific, or risk-based rulemaking

# Questions?

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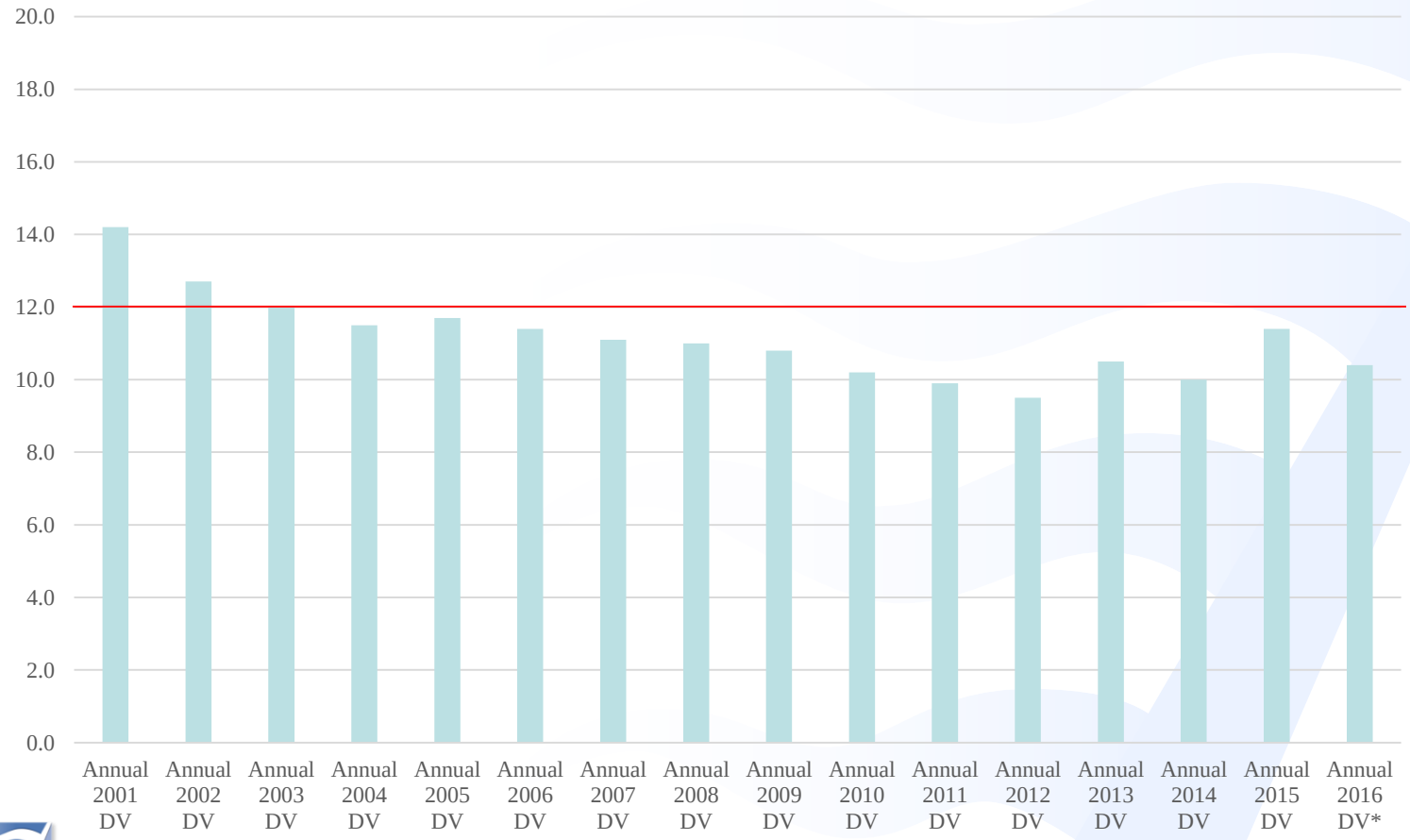
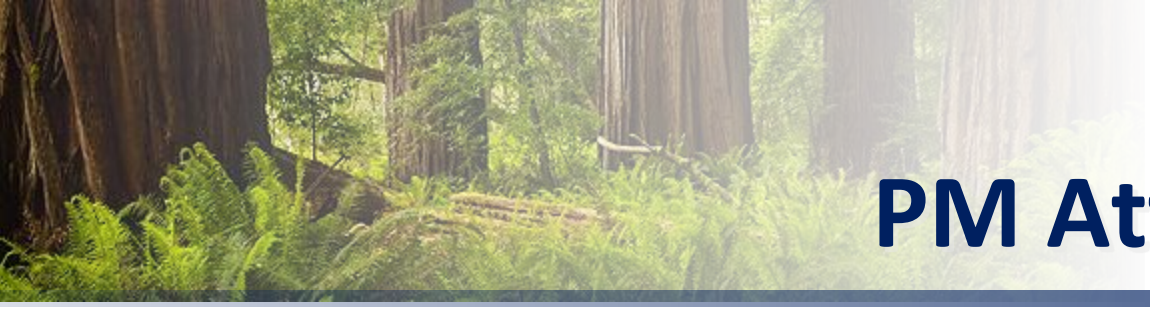
# Reference Slides

# Air Quality Trends

## Annual $PM_{2.5}$ Average (Design Value)





# PM Attainment Status

## National Ambient Air Quality Standards for PM:

- 24-hour $PM_{10}$ standard = 150 µg/m$^3$. Bay Area Peak = 54 - 61 µg/m$^3$
- 24-hour $PM_{2.5}$ standard = 35 µg/m$^3$. Bay Area Peak = 36 - 49 µg/m$^3$
- Annual 3-Year Average $PM_{2.5}$ standard = 12 µg/m$^3$. Bay Area Peak = 10.4 µg/m$^3$

Meeting national requirements

- Need to submit Maintenance Plan to be redesignated as Attainment

Currently no standards for ultrafine PM

## California Ambient Air Quality Standards for PM:

- 24-hour $PM_{10}$ standard = 50 µg/m$^3$. Bay Area Peak = 54 - 61 µg/m$^3$
- Annual Average $PM_{10}$ standard = 20 µg/m$^3$. Bay Area Peak = 22.3 µg/m$^3$
- Annual Average 3-Year Maximum $PM_{2.5}$ standard = 12 µg/m$^3$. Bay Area Peak = 12.8 µg/m$^3$

NOT meeting the state requirements - six year period from 2011 through 2016:

- exceeded State annual average $PM_{10}$ standard (20 µg/m$^3$) in 2011, 2013 and 2015
- exceeded State 24 hour average $PM_{10}$ standard (50 µg/m$^3$) 18 times / locations
- exceeded State annual average $PM_{2.5}$ standard (12 µg/m$^3$) in two different locations in 2013

Exceedances almost always occur during winter Spare the Air season, or from wildfires

# Regulatory Control Programs

## Industrial Sources

- Regulations & permit conditions
- Control measures to reduce PM emissions in 2010 & draft 2017 Clean Air Plan
- Rule 6-5 addresses condensable PM from refinery Fluid Catalytic Cracking Units

## Area Sources

- Rule 6-3 addresses wood-burning rule & Winter Spare The Air program

## Mobile Sources

- ARB regs reduce PM from shipping, heavy-duty & light-duty vehicles & equipment
- Mobile Source Compliance Plan: District enforces ARB regs in Bay Area
- Grants & Incentive programs to complement regulations
- Transportation & Mobile control measures in 2010 Clean Air Plan and draft 2017 Clean Air Plan

**Multi-pollutant control strategy in 2010 CAP and draft 2017 CAP is backbone of current program to reduce PM**

# Current PM Regulations

- Regulation 2, Permits, Rule 2: New Source Review
- Regulation 5, Open Burning
- Regulation 6, Particulate Matter, Rule 1: General Requirements
- Regulation 6, Particulate Matter, Rule 2: Commercial Cooking Equipment
- Regulation 6, Particulate Matter, Rule 3: Wood Burning Devices
- Regulation 6, Particulate Matter, Rule 4: Metal Recycling and Shredding Operations
- Regulation 6, Particulate Matter, Rule 5: Particulate Emissions from Refinery Fluidized Catalytic Cracking Units
- Regulation 9, Inorganic Gaseous Pollutants, Rule 13: Nitrogen Oxides, Particulate Matter, and Toxic Air Contaminants from Portland Cement Manufacturing
- Regulation 10: Standards of Performance for New Stationary Sources
- Regulation 12, Miscellaneous Standards of Performance, Rule 4: Sand Blasting
- Regulation 12, Rule 13: Foundry and Forging Operations
- Federal New Source Performance Standards (40 C.F.R. Part 60)
- Federal National Emission Standards for Hazardous Air Pollutants (NESHAPs) (40 C.F.R. Part 63)

# Targeted Sources

| Source Categories | $PM_{10}$ | $PM_{2.5}$ |
|---|---|---|
| Road Dust – 6 subcategories | 28.1 tpd | 4.0 tpd |
| Construction Dust – 5 subcategories | 11.5 | 1.1 |
| | | |
| Industrial Combustion | 5.2 | 5.1 |
| • Petroleum Refinery Combustion | 2.5 | 2.5 |
| | | |
| Industrial/Commercial Processes | | |
| • Petroleum Refinery Processing | 0.3 | 0.2 |
| • Chemical Manufacturing | 0.4 | 0.4 |
| • Food & Agricultural Processes | 0.4 | 0.3 |
| • Wood Products | 0.1 | 0.1 |
| • Asphalt | 0.2 | 0.2 |
| • Concrete | 1.1 | 0.8 |
| • Glass | 0.7 | 0.7 |
| • Stone, Sand & Gravel | 0.4 | 0.1 |
| • Landfills & Waste Management | 1.9 | 0.5 |
| • Other | 0.8 | 0.5 |

# Control Methods

## Combustion

- Minute amounts of black carbon from incomplete combustion
  - indicated by CO emissions
- Exempt from Rule 6-1 since there is no technical solution to this problem

## Industrial / Commercial Processes:

- Dust control required where solids and solids handling are exposed to wind
- Truck traffic is often the largest source of dust emissions
- When solids handling and processing are contained and vented through a stack
  - Wet mechanical scrubbers and/or cyclones: 50 – 70% effective
  - Baghouses, or Electrostatic precipitators: $90^{+}$% effective

## Road Dust:

- Mud and other solids on roads are entrained into the air by traffic

# Control Methods

## Bulk Materials & Construction Dust:

- Wind Erosion
  - Wind screens effective for stockpiles, conveyors, and disturbed surfaces
  - Wind screens not effective at construction sites
  - Water is frequently used to reduce dust
- Truck traffic is a significant source of dust on unpaved roads within facilities
  - Water is used to reduce dust (water mist is more efficient than water spray)
- Trackout & Carryout Control
  - Trackout = mud and dirt on vehicles deposited on roads leaving the facility
  - Carryout = spills from the vehicles, or carried off the vehicle onto roads

# Asphalt

- New Regulation 6, Rule 7: Asphalt Operations
  - Hot mix paving asphalt (particularly rubberized paving asphalt) smokes (known as "blue smoke") when delivered from a asphalt plant hopper into a delivery truck. This is very likely condensed asphalt, $PM_{2.5}$.
  - Hot Chip Seal asphalt is sprayed as a liquid onto roads to repair cracks. This material creates significant "blue smoke".
  - Controlled by "blue smoke" abatement – vacuum system & filter.
  - Roofing Asphalt creates odors, and smoke from the Asphalt Kettle
- Controls are not cost effective
  - Blue smoke abatement facilities collect very little material
  - Low Fuming Roofing Asphalt available for only 1 supplier, and increases cost by 30%
- Affected Facilities
  - ~ 2 Chip Seal Asphalt jobs - 0.02 tpd $PM_{10}$ - 0.02 tpd $PM_{2.5}$
  - ~100+ Roofing Asphalt jobs - 0.06 tpd $PM_{10}$ - 0.06 tpd $PM_{2.5}$
  - ~ 10 Paving Asphalt Plants ?