



2012 PM2.5 Attainment Plan Public Workshop

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April 30, 2012



Agenda

- Overview of *2012 PM2.5 Plan*
- PM2.5 in the San Joaquin Valley
- Air Quality Trends
- Emissions Inventory
- Modeling Analysis
- Emission Reduction Strategies
- Next Steps
- Public Comment



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Background

- EPA established new PM2.5 standard in 2006
- Lowered 24-hr standard from 65 to 35 $\mu\text{g}/\text{m}^3$
- New Plan is due to EPA in December 2012
- **Goal:** Adopt plan that attains the new standard as expeditiously as possible
- Attainment must be achieved no later than December 2019
- Governing Board adopted Guiding Principles for development of *2012 PM2.5 Plan* during February 2012 public meeting

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Guiding Principles

1. With public health as our #1 priority, meet the federal ambient air quality standards as expeditiously as practicable
2. Use sound science as the plan's foundation
3. Consider the Valley's unique challenges and develop cost-effective strategies
4. Look beyond traditional regulations including working with cities and counties to incorporate the 2012 PM2.5 Plan principles in their general plans
5. Provide a balanced approach to reducing mobile and stationary source emissions
6. Involve the public in reducing emissions

Guiding Principles (cont'd)

7. Prioritize strategies with the greatest public health benefits
8. Prioritize strategies that contribute to attainment of multiple air quality standards
9. Every sector must continue to reduce emissions
10. Compel State and Federal agencies to provide adequate resources and regulatory assistance
11. Address air pollutant transport issues with air districts neighboring the Valley
12. Provide ample opportunity for public participation and feedback
13. Build off the successes of the District's Technology Advancement Program

Federal Plan Requirements

- Analysis of PM2.5 Concentrations
- Emissions Inventories
- Photochemical Modeling and Weight of Evidence to Identify Emission Reductions for Attainment
- Emission Control Strategies
- Transportation Conformity Budgets
- Reasonable Further Progress Demonstration
- Contingency Measures

Risk-Based Strategy

- Proactive approach to prioritize public health improvements within the District's attainment strategies
- Looking for opportunities to prioritize future control strategies, incentive programs, and public engagement efforts that achieve the greatest health benefits
- Existing efforts that prioritize public health beyond the NAAQS – SIP process:
 - Rule 4901
 - Check Before You Burn
 - District grant programs – Clean Green Yard Machine
 - Real Time Air Quality Advisory Network

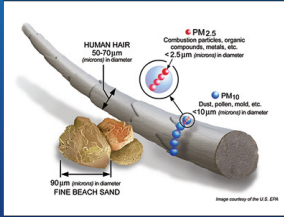
Risk-Based Strategy (Cont'd)

- Integrating Risk-based Strategy into *2012 PM2.5 Plan* in the following areas:
 - Health research discussion
 - Ambient data analysis
 - Emissions, modeling, and weight-of-evidence analysis
 - Population exposure analysis
 - Control measure prioritization

PM2.5 in the San Joaquin Valley

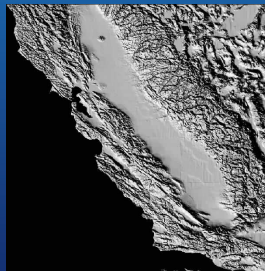
What is PM2.5?

- A mixture of solid particles and liquid droplets in the air
- Emitted directly or formed indirectly through chemical reactions
- Composed of ammonium nitrates, ammonium sulfates, organic carbon, elemental carbon, metals, and dust particles



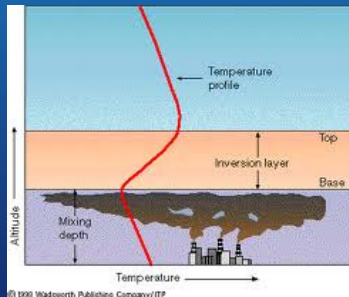
Valley PM2.5 Challenges

- Geography and meteorology
- Temperature inversions
- Biogenic emissions
- Air pollution transport
- Population increases



Temperature Inversions

- Pollutant concentrations can become elevated
- Emissions are trapped near the surface



Overview of PM2.5 Health Effects

- Potential health impacts related to the size, chemical composition, surface area
- Health effects include aggravated asthma, increased respiratory symptoms, decreased lung function in children, lung cancer and premature death

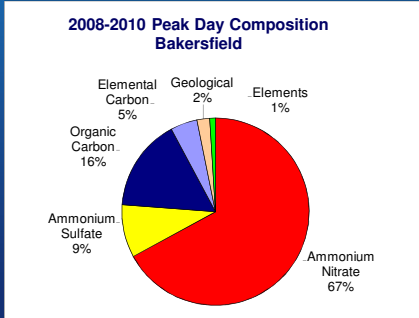
Overview of PM2.5 Health Effects

- Attaining this standard would help prevent:
 - 814 premature deaths
 - 384,554 cases of respiratory symptoms and bronchitis
 - 584 non-fatal heart attacks
 - 289 hospital admissions for cardio/respiratory issues
 - 440 ER visits for children's asthma
 - 386,340 minor restricted activity days
 - 68,740 work loss days
- \$5.6 billion total costs (Hall, 2008)

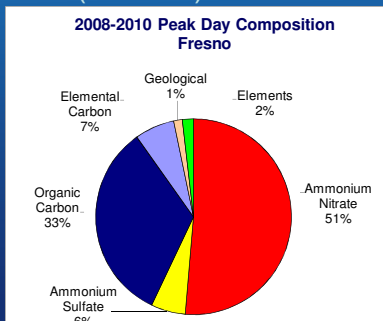
Diversity of PM2.5 in the Valley

- **Organic Carbon:** combustion (ex: residential wood combustion), geologic, road dusts
- **Elemental Carbon:** also called soot or black carbon; incomplete combustion (ex: diesel engines)
- **Geologic:** road dust and soil dust
- **Trace metals**
- **Sea salt** – sodium chloride in sea spray
- **Ammonium Nitrate:** reaction of ammonia and nitric acid
- **Ammonium Sulfate:** reaction of ammonia and sulfuric acid

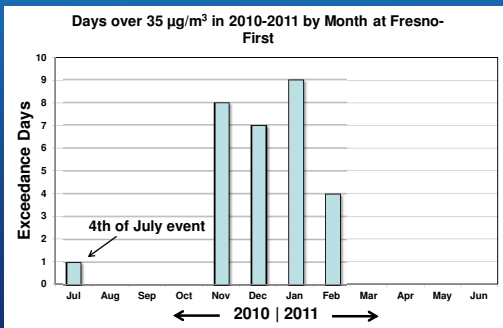
Monitored Chemical Composition of PM2.5 (Bakersfield)



Monitored Chemical Composition of PM2.5 (Fresno)



Winter-time Problem



Air Quality Trends

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HEALTHY AIR. LIVING.

Air Quality Trends

- Various metrics can be used to measure air quality progress
 - “Design values:” the attainment test; 3-year averages following EPA protocols
 - “Exceedances days” (24-hr average greater than 35 $\mu\text{g}/\text{m}^3$)
 - Air Quality Index (AQI) Trends
 - Concentrations by hour, day, and season

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Air Quality Trends

- Observing longer trends provides more insight; year-to-year comparisons can be shortsighted
- Progress has been made, but the Valley still has a long way to go

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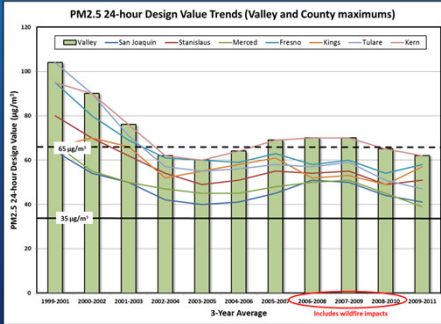
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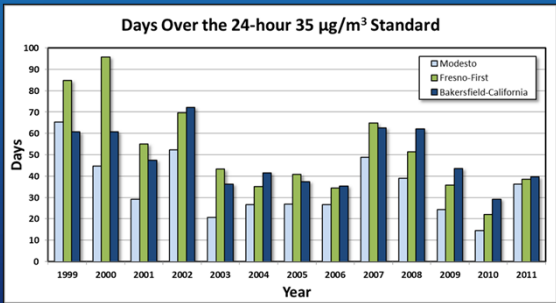
Air Quality Trends

- Steep improvement from 1999 to mid 2000s; improvement has been more shallow since
- Highest values during the winter months
- Highest concentrations occurring less frequently
- PM2.5 measurements are highest in the Fresno and Bakersfield areas of SJV

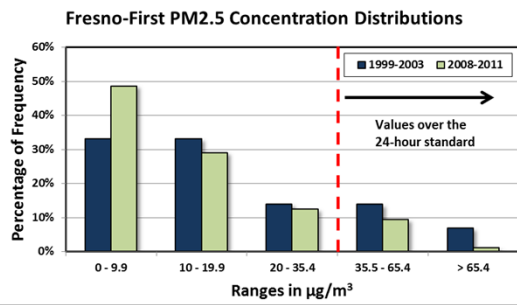
Air Quality Trends



Air Quality Trends



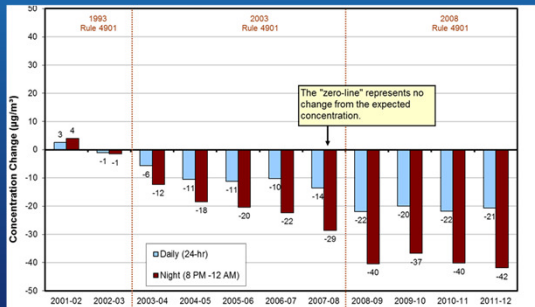
Air Quality Trends



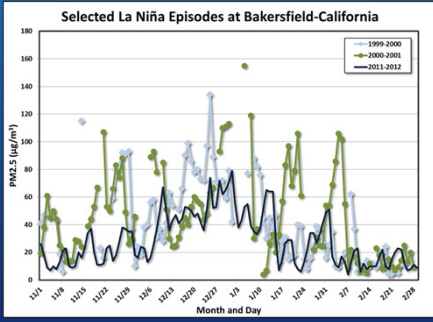
2011-12 Wood-burning Season

- Due to the La Niña weather pattern, the Valley experienced stagnant atmospheric conditions throughout the wood-burning season.
 - Unusually prolonged stagnation periods
 - Extremely cold overnight temperatures
 - Strong surface-based temperature inversions
- However, the effectiveness of the Rule evident when removing weather influences
- Overall trend in decreasing PM2.5 levels continues

Rule Effectiveness Evident



Air Quality Trends

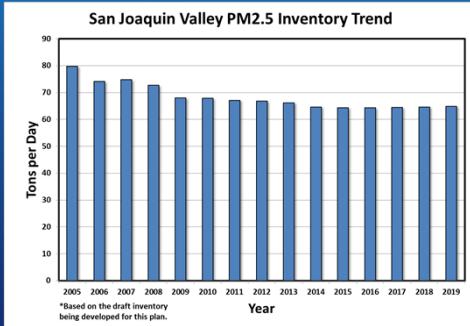


Emissions Inventory

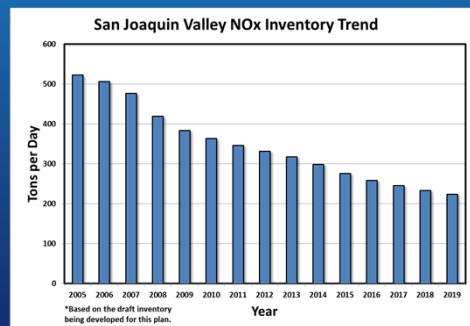
Emissions Inventory

- Represents an accounting of stationary, area, mobile, and natural sources of pollution in the Valley
- Inventory is built through permits data, surveys, and various methodologies
- Continuously reviewed and updated
- Used to project air quality in the future and to help establish a control strategy

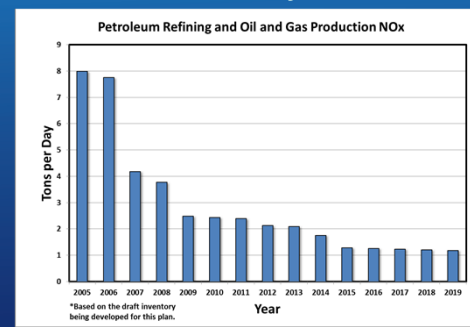
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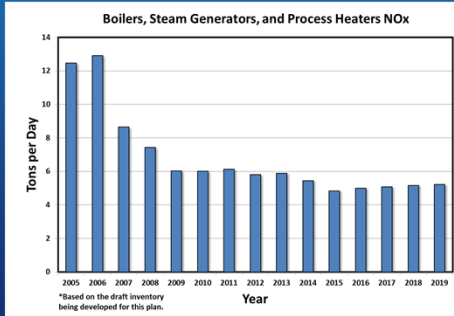
Emissions Inventory



Emissions Inventory

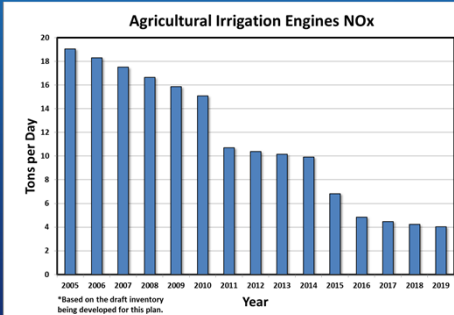


Emissions Inventory



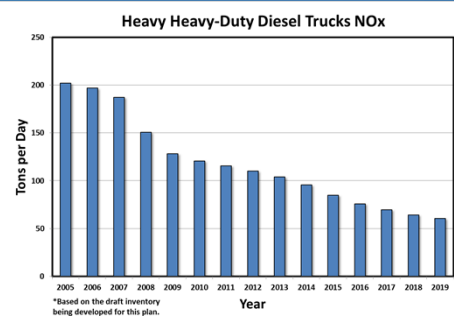
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Emissions Inventory



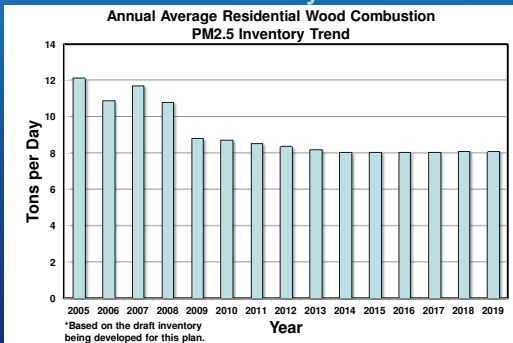
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Emissions Inventory



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Emissions Inventory



Modeling Analysis

Weight of Evidence Approach for Attainment

- Use all available technical information in a corroborative manner to determine best attainment strategy:
 - Grid-based photochemical modeling
 - Supplemental analyses:
 - Air quality trends
 - Emission trends
 - Source – receptor modeling (CMB, etc.)

Use and Application of Photochemical Models

- Attainment test combines measured data and modeling to project air quality into the future
 - Speciated Model Attainment Test (SMAT)
- Based on atmospheric science, chemistry, meteorology, and more
- Used as a guide in developing a control strategy, and provides evidence that the strategy will be successful

Modeling Performance Evaluation

- Operational (quantitative) – Ability to reproduce observed temporal and spatial patterns for meteorological parameters and pollutants
- Phenomenological (qualitative) – General comparisons of observed features
- Diagnostic (semi-quantitative) – How accurate is the model in characterizing the sensitivity of $PM_{2.5}$ (and species) to changes in emissions?
- Corroborative (qualitative) – Model consistent with other analyses?
- ARB Technical Symposium held April 27

Emission Reduction (Control) Strategies

Evaluation of Control Strategies

- Will evaluate all sources for potential emission reduction strategies – “No stone left unturned”
- Will build upon strong regulations recently adopted by the District and ARB under current ozone and PM2.5 plans
- Sources under District’s regulatory authority have already been required to reduce emissions at or beyond Reasonably Available Control Technology (RACT)
 - Stationary source NOx emissions reduced by 80%
- ARB has recently adopted numerous regulations to reduce emissions from mobile sources

Types of Control Strategies

- Regulatory
- Incentive programs
- Technology advancement programs
- Legislative platform and policy positions
- Public outreach and education

Factors to Consider when Evaluating Control Strategies

- Technological feasibility
- Reasonably Available Control Technology (RACT) & cost effectiveness
- Relevance to attainment
- Risk-Based Strategy

Control Strategy Source Categories

- Stationary and Area Sources:
 - Includes industrial/manufacturing, lawn care, commercial cooking, residential wood burning, agricultural sources, etc.
 - Account for 15% of NOx emissions in the Valley
- Mobile Sources:
 - Mobile sources account for over 80% of NOx emissions in the Valley and a significant portion of direct PM2.5
 - District lacks regulatory authority (under ARB and EPA authority)
 - *Vision for Clean Air: 2012 to 2050*

Importance of Public Input

Evaluation in progress; District is seeking input from stakeholders

Next Steps in the Planning Process

Next Steps

- Subsequent drafts of this plan will include preliminary analysis and discussion on:
 - Regulatory control strategies
 - Incentive programs
 - Technology advancement
 - Public outreach
 - Legislative efforts
- Additional opportunities for public comments

Proposed Timeline for 2012 PM2.5 Plan

Ongoing	Outreach on plan process and findings: presentations/discussions with stakeholders at various meetings
April 27 th and 30 th 2012	Public workshops and commenting period
June 2012	Public workshops and public commenting on revised plan draft
August 2012	Public workshops and public commenting on revised plan draft
September 2012	Post proposed draft of the plan
October 18, 2012	District Governing Board hearing to adopt the plan
November 15-16, 2012	ARB hearing to adopt the SJV plan and the state strategy
December 14, 2012	Plan due to EPA

Open Discussion

webcast@valleyair.org

Public Comments

To ensure consideration prior to next workshop comments due by 5:00 PM on May 14, 2012

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