

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



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



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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



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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



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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



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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



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PM2.5 in the San Joaquin Valley

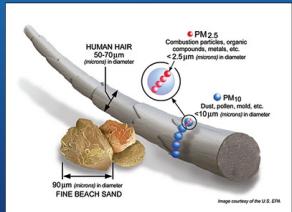


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What is PM2.5?

- 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



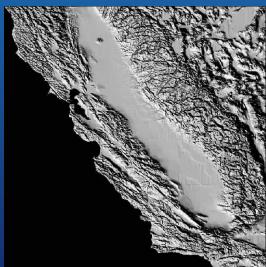
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Valley PM2.5 Challenges

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



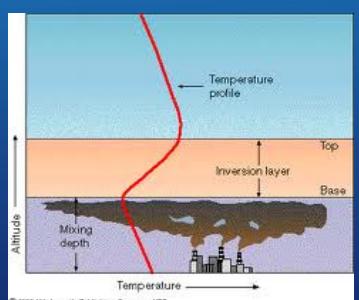
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Temperature Inversions

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



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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

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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)

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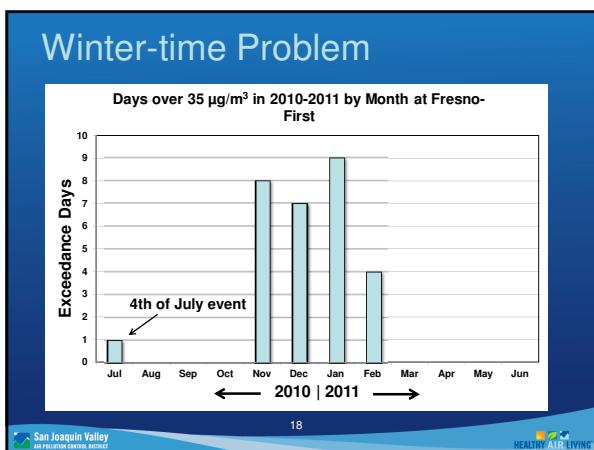
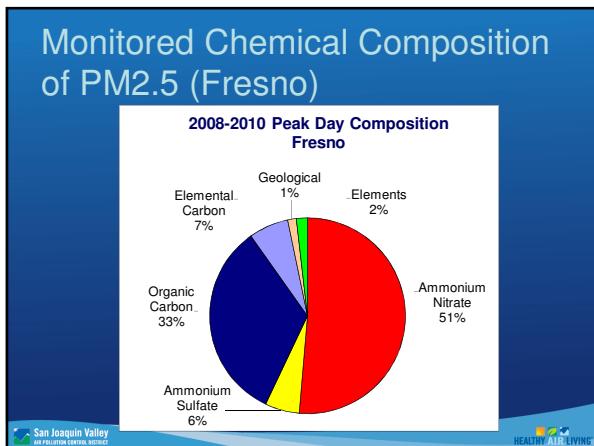
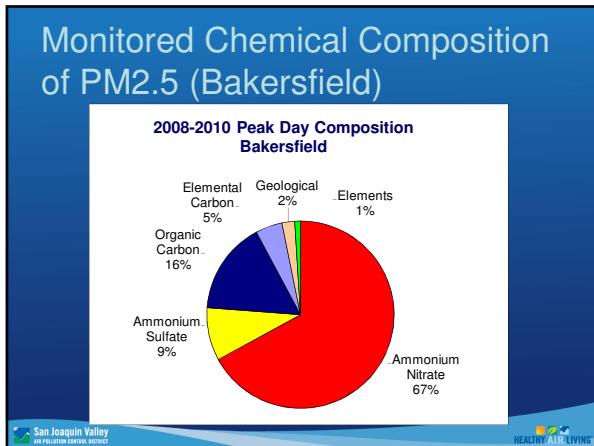


Diversity of PM2.5 in the Valley

- **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

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Air Quality Trends

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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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Air Quality Trends

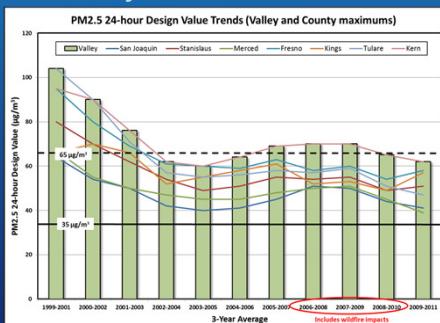
- Steep improvement from 1999 to mid 2000s; improvement has been more shallow since
- Highest values during the winter months
- Highest concentrations occurring less frequently
- PM2.5 measurements are highest in the Fresno and Bakersfield areas of SJV

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Air Quality Trends

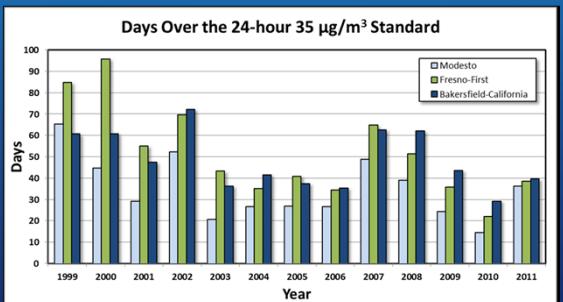


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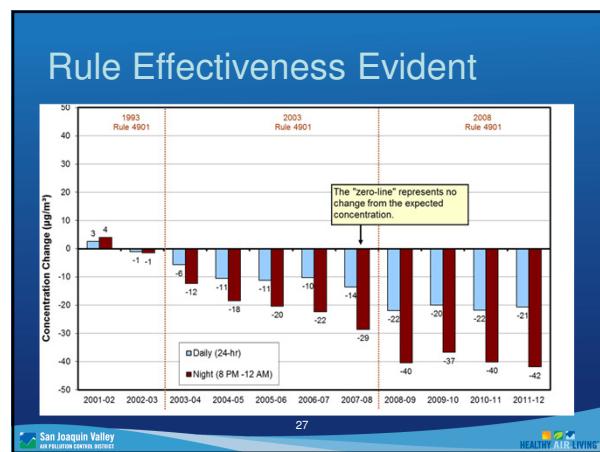
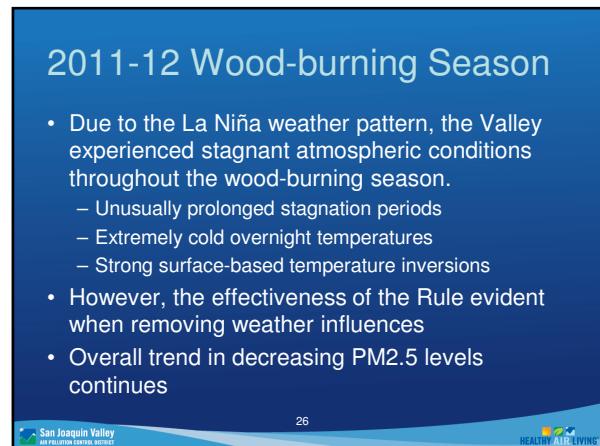
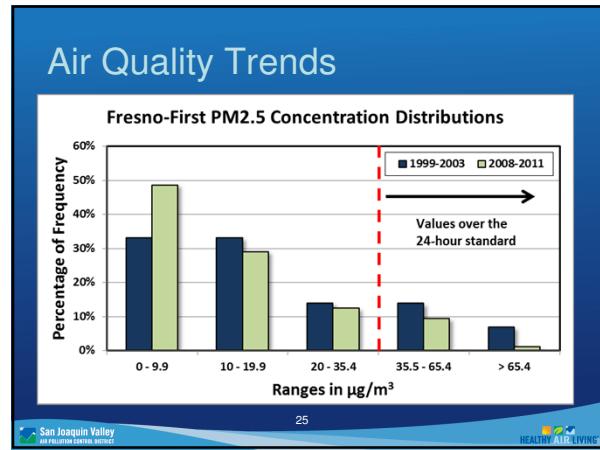
Air Quality Trends



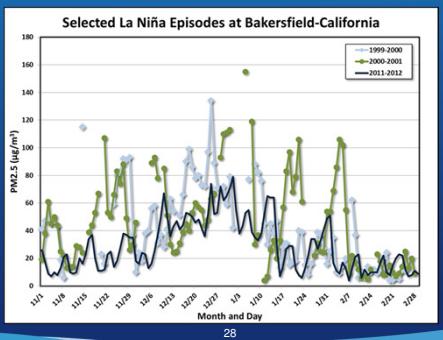
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Air Quality Trends



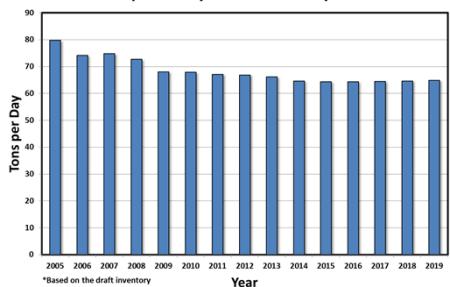
Emissions Inventory

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

Emissions Inventory

San Joaquin Valley PM2.5 Inventory Trend



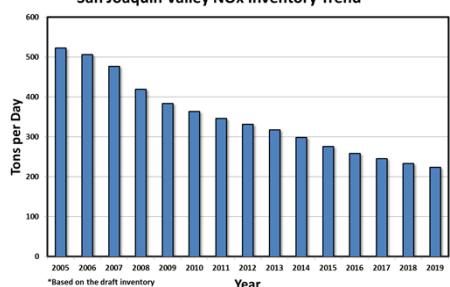
*Based on the draft inventory being developed for this plan.

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Emissions Inventory

San Joaquin Valley NOx Inventory Trend



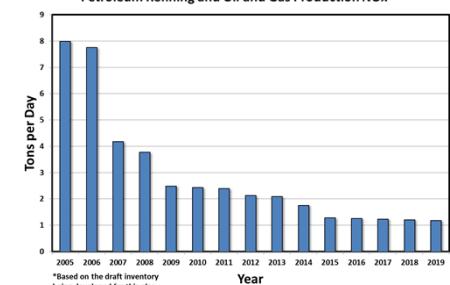
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Emissions Inventory

Petroleum Refining and Oil and Gas Production NOx



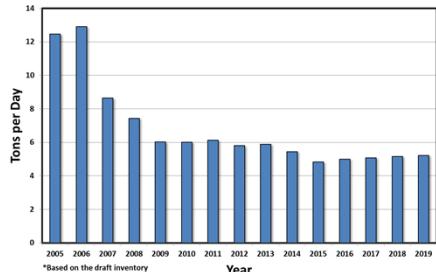
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Emissions Inventory

Boilers, Steam Generators, and Process Heaters NOx



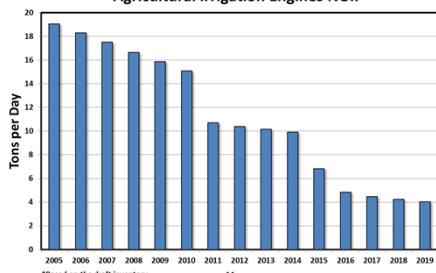
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Emissions Inventory

Agricultural Irrigation Engines NOx



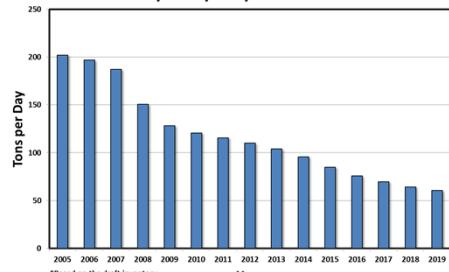
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Emissions Inventory

Heavy Heavy-Duty Diesel Trucks NOx



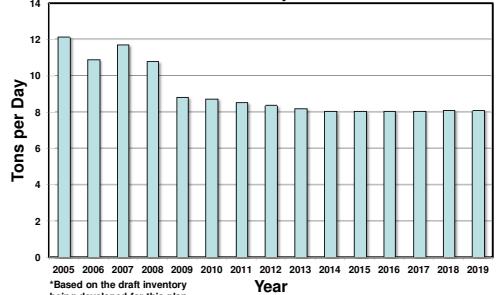
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Emissions Inventory

Annual Average Residential Wood Combustion
PM2.5 Inventory Trend



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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.)

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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



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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



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Emission Reduction (Control) Strategies



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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

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Types of Control Strategies

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

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Factors to Consider when Evaluating Control Strategies

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

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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*



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Importance of Public Input

Evaluation in progress; District is seeking input from stakeholders



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Next Steps in the Planning Process



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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

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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

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Open Discussion

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Public Comments

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

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