A Risk-Based Approach to Air Quality Planning for New Particulate Matter and Ozone Standards

Presented to USDA NRCS

Agricultural Air Quality Task Force

February 2012

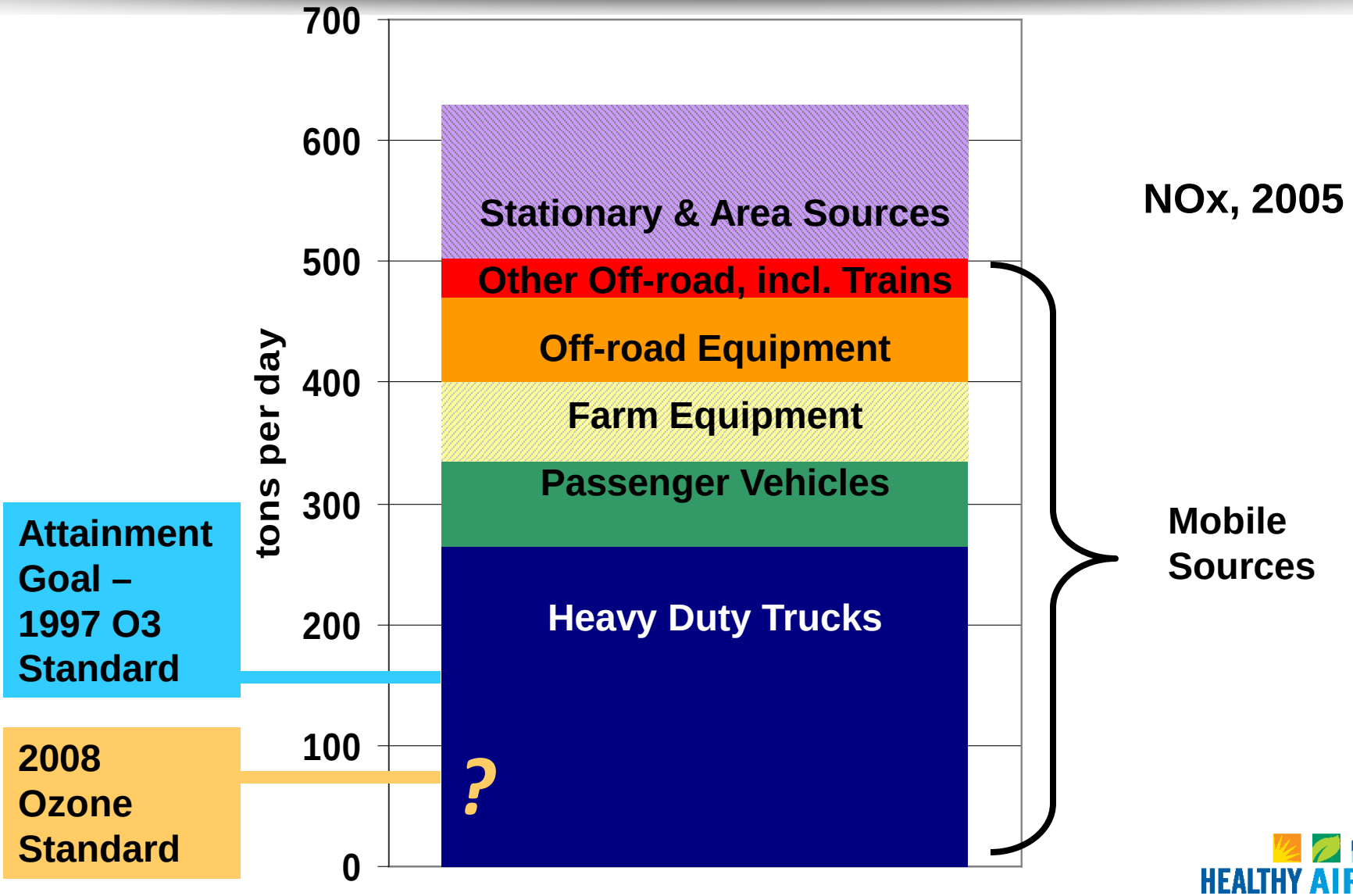
Air Quality Planning Process

- CAA requires EPA to set health-based NAAQS
- EPA designates areas as attainment or nonattainment
- EPA adopts implementation regulations - Guidance
- States & Local Districts develop SIPs to meet NAAQS
  - Modeling to project tons of reductions needed
  - Control measures (Rules) to achieve those tons of reductions
  - Reductions "generally linear" over time on a mass basis
- Non-attainment Areas are developing new SIPs
  - 2006 24 hour PM2.5 standard (Plan Due in 2012 for SJVAPCD)
  - 2008 8-hour Ozone standard (Plan Due in 2013 for SJVAPCD)
- EPA reevaluate standards every 5 years
  - PM2.5 standards to be reevaluated in 2012
  - Ozone standard to be reevaluated in 2013

Planning for New Federal Standards will be a Great Challenge for Some Non-attainment Areas

- Most control measures that are feasible/cost effective for Stationary Sources are already in place
  - SJVAPCD > 500 rules/amendments since 1990
  - Up to four generations of control with rapidly rising cost
  - Result: 80% reduction NOx/VOC from stationary sources, much better air quality
- Mobile Source emissions have also been reduced
  - U.S. EPA, CARB has adopted new vehicle standards
  - Spending hundreds of millions in S/L funding on incentives
  - Result: 60% reduction in emissions from mobile sources, much better air quality
- However, still not close to meeting 1997 Ozone standard

Additional Reductions Needed to Meet New Standards in San Joaquin Valley



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Meeting New Federal Standards

- To Meet 2006 PM2.5 standard (2019)
  - Significant emissions reductions in all categories
  - Turnover of legacy mobile source fleets
  - More investment over many years
- To Meet 2008 federal ozone standard (2031)
  - Need transformative measures (esp. goods movement)
  - New technologies (zero or near-zero emissions)
  - Massive investment over many, many years

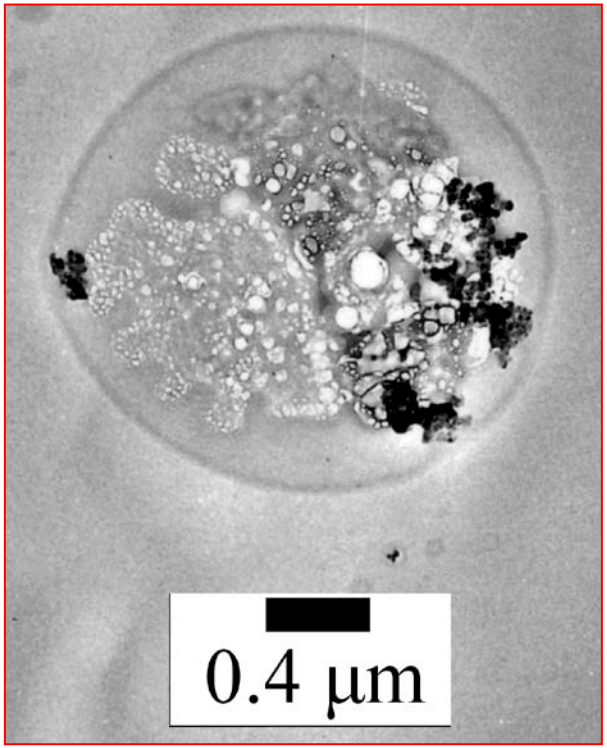
Question: As we work towards meeting these standards, how do we prioritize use of our resources and demonstrate progress as required under the CAA?

Risk-Based Approach to Implementation

- Enable regions with mature air quality programs to focus efforts on meeting the new standard in the most expeditious fashion through deployment of scarce resources in a manner that provides the most benefit to public health
- A more strategic approach in which public health serves as the key factor in prioritizing control measures, regulated pollutants and sources of emissions
- In our journey towards meeting the standard, progress is measured by improvement in public health

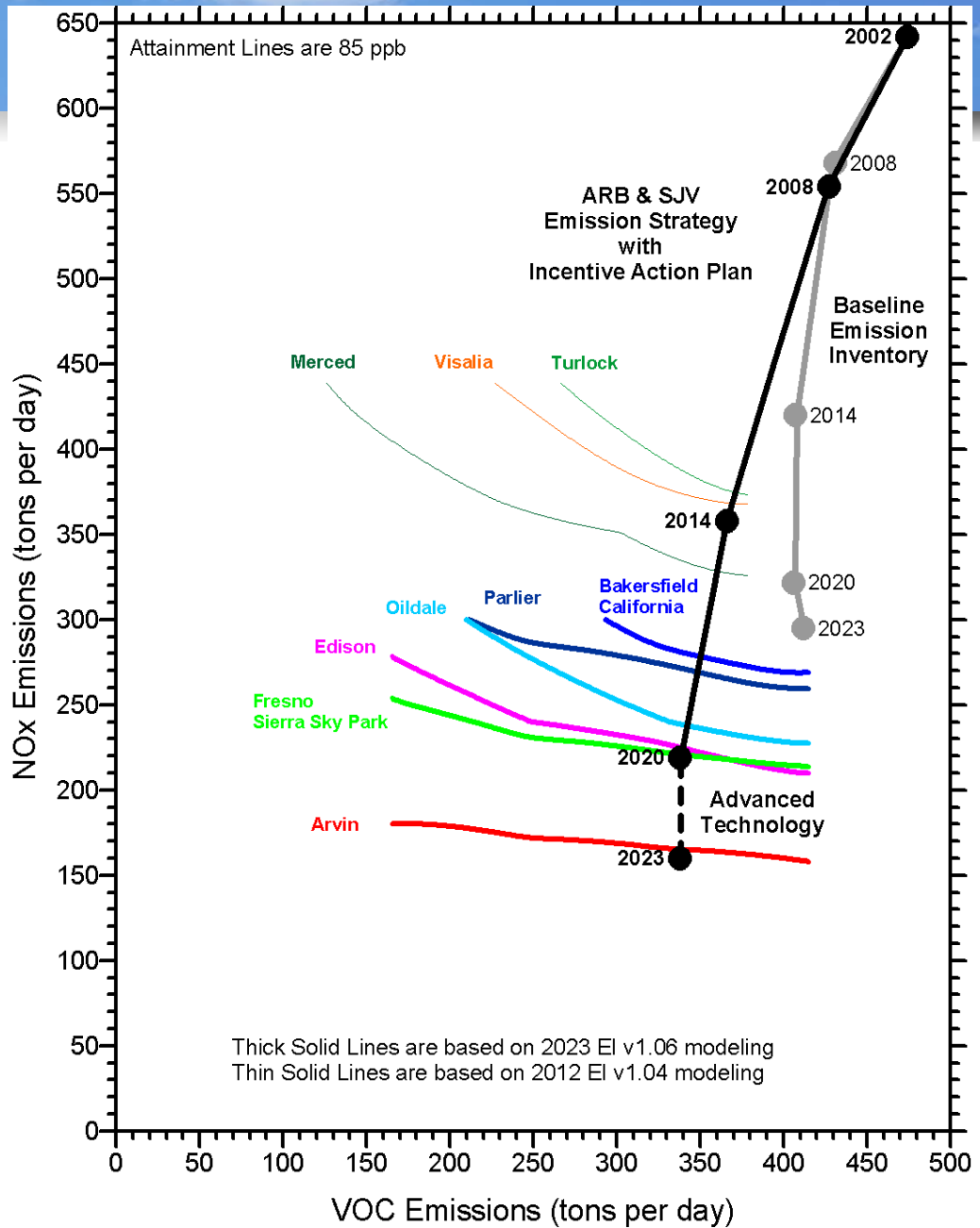
Health Risk Factors for PM2.5

Electron micrograph of a PM2.5 particle



- Health risk depends on exposure - not mass emissions
- Chemical composition
  - Some compounds more toxic (PAHs, metals), likely to cause irritation, inflammation
  - Some compounds less toxic (ammonium nitrate/sulfate)
- Particle size and surface area are also important
- Particles are complex
- More research needed

Science Can Also Guide Efforts to Meet Ozone Standards



One Example

- As we progress toward attaining 1997 Ozone standard, VOC reductions become less and less effective
- NOx reductions will be much more effective in SJV

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Health Effects Research: Research is Key to Evidence-Based Policy

Health Benefit Evaluation of Rule 4901 (Residential Woodburning) (2008):

- Rule 4901 reduced annual PM2.5 levels by about 12.9% in Bakersfield & 13.6% in Fresno; 30 & 70 fewer premature deaths.

Clinical Evaluation: PM2.5 Impact, Fresno Asthmatics (2008-9):

- UCSF-Fresno study showed reduced lung function and elevated oxidative stress following periods of high PM2.5.

Epidemiological Study, Modesto, Fresno, and Bakersfield (2010-11) Central Valley Health Policy Institute and UCSF-Fresno:

- Elevated ozone & PM2.5 correlated to elevated hospital admission rates, especially for asthma in those 19 years or younger.

Health Effects of Speciated Particulate Aerosols (2011-12):

- Will investigate whether speciated PM2.5 correlates with various health outcomes.

Pilot Study of Ultrafine Particle Plumes in Fresno (2011-12):

- Investigating quantity and spatial distribution of plumes from key sources of urban UFP.

How Might Risk-Based Approach Be Implemented?

- For 2012 PM 2.5 Plan, potentially include:
  - Chapter on health risks of emissions and health benefit of Plan
  - New control measures aimed specifically at high risk emissions
  - Include incentive measures aimed at high risk emissions (older diesel school buses, gross polluting vehicles, lawn care, etc.)
  - Qualitative evaluation of risk reductions for each control measure
  - Prioritization (front-loading) of measures that will reduce high risks to the extent possible under implementation rule
  - Quantitative analysis of Plan health benefit with EPA BenMAP
  - Proposal for further health research
- For 2013 Ozone Plan (in addition to items above):
  - Pursue new provisions for risk consideration in EPA implementation guidance (RACT, RFP, Contingencies)
  - Prioritize measures that maximize ozone reductions

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Risk-Based Approach Recommendations

- Consider support for risk-based approach
- Consider supporting specific recommendations for EPA regarding using risk-based approach to address Clean Air Act requirements for RFP, RACT, and contingencies
- Recommend support for further research

❖ Note that U.S. EPA has been very cooperative and open to discussing and evaluating risk-based approach