

Review of the California Ambient Air Quality Standards for Particulate Matter and Sulfates

June 2002 Public Workshops



California Air Resources Board

California Environmental Protection Agency

Purpose of Standard Review

- **Ensure State standards are based on best available information on health effects**
- **Comply with Children's Environmental Health Protection Act (SB25, Escutia, 1999)**
- **Ensure each standard provides adequate protection of public health**

Why Are We Concerned About Particles?

- **Health effects are significant and include premature death and cardiorespiratory disease**
- **Body of evidence is substantial**
- **Vulnerable groups include children, asthmatics, and those with pre-existing heart and lung disease**
- **Exposure is high in California**
- **The health benefits from lowering PM levels are substantial**

Standards Review Process



Steps Toward New PM Standards

Nov. 30, 2001	Draft Report released
Dec. 2001	Public workshops
Jan. 24-25, 2002	AQAC meeting
Mar. 12, 2002	Draft 24 hr. PM 2.5 standard
Apr. 3, 2002	2nd AQAC meeting
May 3, 2002	Final Report released
Jun. 5-6, 2002	Public Workshops
Jun. 20, 2002	Board Hearing (El Monte, CA)

AQAC Findings

- **January 2002**

- Recommendations in Nov. 30 Draft were well-founded and based on sound scientific knowledge, methods, and practices
- Development of a 24-hour standard for PM_{2.5} was requested

- **April 2002**

- Committee endorsed the proposed 24-hour standard for PM_{2.5}

Recommendations for Particulate Standards

PM10 – Reduce annual average standard to 20 mg/m³
– Retain 24-hour standard of 50 mg/m³

PM2.5 – Add annual average standard of 12 mg/m³
– Add 24-hour standard of 25 mg/m³

Sulfates – Retain 24-hour standard of 25 mg/m³
– Establish alternate monitoring method

Recommendations for Monitoring Methods

- **Adopt existing Federal Reference Methods (FRMs) for PM10**
- **Adopt existing FRM for PM2.5**
- **Use ARB Method 007 for PM10 sulfate**
- **Designate continuous methods as acceptable for PM10 and PM2.5**

Epidemiological Data Used to Set Standards

- **Represent real-world exposures and health responses**
- **Can examine different segments of the population (e.g., elderly, asthmatics, children)**
- **Results supported by toxicological and clinical studies**
 - More information needed to clarify biological mechanisms and most important PM constituents

PM Epidemiology Studies: Short-term Exposures

- Increases in mortality in over 200 cities linked to increases in daily exposures to PM10 and PM2.5**
- Increases in heart and lung disease occurrence linked to increases in daily PM10 exposure**

Multi-city Mortality Studies

- **NMMAPS – 90 U.S. cities**
- **Harvard Six Cities Study**
- **10 U.S. cities (Schwartz 2000)**
- **8 largest Canadian cities
(Burnett et al. 2000)**
- **29 European cities
(Katsouyanni et al. 2001)**

Results of PM Mortality Studies: Short-term Exposures

- Most show associations between daily or multi-day averages of PM and all-cause mortality, respiratory and cardiovascular mortality, and mortality for those > 65 years of age.
- Document cites 64 single-city studies using PM₁₀; other PM metrics used include PM_{2.5}, coarse particles, black smoke, COH, and extinction coefficient.

PM Epidemiology Studies: Short-term Exposures

Studies encompass a wide range of:

- Climates and seasonal patterns**
- PM concentrations and mixtures**
- Co-pollutants and weather variables**
- Population characteristics**
- Other relevant factors**

PM Epidemiology Studies: Short-Term Exposures

Adverse health outcomes include:

- Cardiorespiratory hospitalizations
- Emergency room visits
- School absenteeism
- Asthma attacks in children
- Bronchitis & other respiratory symptoms in children
- Decreased lung function in children

Results of PM Mortality Studies: Long-Term Exposures

- Long-term exposure to PM10 and PM2.5 associated with increased mortality**
- The largest study involves the American Cancer Society study of roughly 550,000 individuals in 151 cities**
- Associations observed for both cardiopulmonary mortality and lung cancer; significant loss in life expectancy**

Rationale for New PM Standards

- **Hundreds of studies published in last decade confirm linkages with mortality and other adverse health effects at or near current ambient concentrations**
- **Recent studies suggest effects from both fine particles (PM_{2.5}) and coarse particles (PM₁₀ – PM_{2.5})**
- **Health effects linked to both long- and short-term exposures**

Rationale for New PM Standards

- Based on a thorough review of the evidence, OEHHA and ARB recommend annual and 24-hour standards for both PM10 and PM2.5**
- Recommended standards are below concentrations at which adverse health effects have consistently been observed**

Expected Health Benefits from Attaining Proposed Standards

Meeting the proposed annual-average PM standards would prevent about:

- 6,500 deaths per year
- 3,100 cardiovascular and 2,900 respiratory hospitalizations among those older than 65
- 1,000 asthma hospitalizations among those younger than 65
- 389,000 incidences of lower respiratory symptoms among children aged 7 – 14
- 2.8 million lost work days

Recent Developments Affecting Air Pollution Studies

- Researchers at Johns Hopkins have identified a problem with a statistical software package sometimes used in time-series studies**
- Adds some uncertainty to estimates in studies of daily mortality and hospital admissions**
- Does not affect overall conclusions that PM exposure increases risks of adverse health outcomes**
- Does not affect estimates of effects from long-term exposure**

Regulatory Timeline

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|-----------------------|---|
| May 3, 2002 | Release of final staff report;
open 45-day public
comment period |
| June 5-6, 2002 | Public workshops |
| June 20, 2002 | Board consideration of
recommended standards
(El Monte, CA) |

Additional Information

- PM standard review website:
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