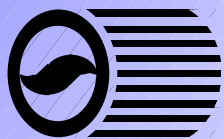


California's Reactivity Program

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at
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Science & Environmental Chamber
Workshop
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California Environmental Protection Agency



Air Resources Board

California's Reactivity Program

- ❖ Regulation
- ❖ Research
- ❖ Internal Reactivity Team
- ❖ External Assistance

VOC Regulation

- ❖ California has an effective system of mass based VOC controls.
- ❖ The SIP relies on with mass-based VOC reductions
- ❖ Important that any reactivity regulation provides ozone reductions equivalent to these mass-based controls.

Reactivity and VOC Regulation

- ❖ Mass-based controls alone may not be sufficient for attainment.
- ❖ Reactivity may provide a cost effective control strategy.
- ❖ Reactivity may provide flexibility to industry.

California's Current Use of Reactivity in Regulation

- ❖ Needed a way to compare alternatively fueled vehicle's emissions.
- ❖ Use of reactivity of vehicle exhaust for comparisons.
- ❖ Adopted LEV/CF regulations in late 1990 with Reactivity Adjustment Factors, RAF
- ❖ $RAF = \frac{\text{Exhaust Reactivity AFV}}{\text{Exhaust Reactivity CFV}}$

Questions Encountered

❖ Which Reactivity Scale?

– MIR

- Dual control program in CA
- MIR scale complements NO_x controls

❖ What about uncertainty?

– Alternative fuels program (LEV/CF)

- MIRs ~30 - 70%
- RAFs ~5 - 15%

Development of Aerosol Coatings Regulation

- ❖ California Low Emissions and Reactivity Regulation for Aerosol Coatings (CLEAR)
- ❖ Voluntary alternative to mass based regulation
 - Product MIR = $\sum \text{Wt\%} \times \text{MIR}$
- ❖ Current Schedule
 - Public Workshops: late Fall 1999, Winter 2000
 - Public Hearing: Spring 2000

Regulatory Challenges

- ❖ Regulation Development
 - Equivalent ozone benefits
 - Enforceable
 - Flexibility
 - Simple
 - Cost Effective

Technical Challenges

❖ Uncertainty

– Alternative Fuels Program

- Relative reactivities reduce uncertainty

– Consumer Products

- Majority of inventory are well studied VOCs
- Adjust MIRs for higher uncert.

❖ Speciation Profiles

- Ongoing efforts to improve chemical speciation data

Previous Research

- ❖ Our regulations have a significant body of previous research to draw on:
 - Atmospheric Chemistry
 - Mechanism Development
 - Uncertainty Analysis
 - Reactivity Values
 - Speciation Profiles

Current CARB Reactivity Research

- ❖ Atmospheric Chemistry of Mineral Spirits
- ❖ Development of Improved Reactivity Measurement Methods
- ❖ Uncertainty Analysis of Chamber Data
- ❖ Peer Review of SAPRC99

Reactivity Research (continued)

- ❖ Reactivity of Stationary Source VOCs
- ❖ Improved Aerosol Speciation Profiles
- ❖ Investigation of Low Reactivity Solvents for Use in Consumer Products
- ❖ Reactivity Values Using Airshed Models

Internal Reactivity Assessment Team

- ❖ Review effectiveness of CARB's current uses of reactivity
- ❖ Examine the technical basis for quantifying reactivity
- ❖ Provide recommendations on how to include reactivity in a coordinated regulatory program

7th International Conference Air Pollution 99

- ❖ Papers presented:
 - Assessment of the organic compound reactivity concept for regulatory applications in California
 - Photochemical reactivity of organic compounds in central California: A grid-based modeling study
- ❖ Contact: Ajith Kaduwela
akaduwel@arb.ca.gov

External Assistance

- ❖ Reactivity Scientific Advisory Committee (RSAC)
 - RSAC meeting October 8, 1999
- ❖ Reactivity Research Advisory Committee (RRAC)

In Summary:

- ❖ Properly designed reactivity-based regulations can add flexibility to control strategies.
- ❖ Reactivity regulations must provide equivalent ozone reductions as the mass-based controls.
- ❖ Will continue to fund research to improve our understanding of reactivity