Aerosol Coatings Reactivity-based Regulation

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VOC Reactivity Technology Forum and Roundtable Discussion

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Outline

- Aerosol coatings regulation
- Why a reactivity-based control program?
- Tools
- Other provisions
- Enforcement
- Next steps
- Lessons learned

California's Aerosol Coatings Regulation

- Mass-based limits adopted in 1995
- Revised tier 2 mass-based limits November 1998
- Reactivity limits adopted in June 2000
  - Title 17, California Code of Regulations (CCR), sections 94520-94528
  - Title 17, CCR, sections 94700 & 94701 (Tables of MIR Values)
- Approved by U.S. EPA as a SIP revision in September 2005

Why a Reactivity-Based Control Program?

- Large VOC mass reductions achieved
- Further reductions needed
- Reactivity provides potential to achieve further ozone reductions when mass reduction not feasible
- Provides formulation flexibility

Tools Necessary for Reactivity Program

- Scale for VOC reactivity comparison
- Detailed product VOC speciation
- Product sales information
- Reactivity of ingredients well-characterized

Scale: Maximum Incremental Reactivity (MIR)

- Developed by Dr. Bill Carter at University of California, Riverside
- Most appropriate for California regulatory purposes
  - LEV/CF regulation
  - Predictive model for fuels
  - Aerosol coatings regulation

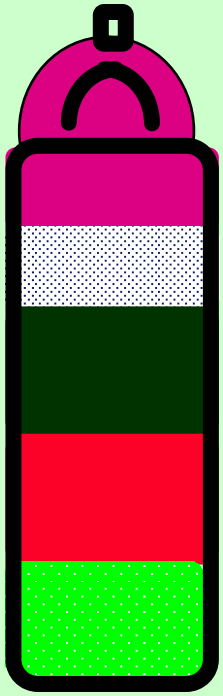
Using the MIR Scale

- Goal was to develop methods so all VOCs can be used
  - Tables of MIR values
  - Upper limit MIRs
  - Hydrocarbon solvent bins
  - To use, compound must be on list
- MIR value uncertainty
- Include provision for updating the scale

Hydrocarbon Solvent Bins

- Twenty bins for solvents predominately paraffinic, isoparaffinic, and cyclic alkanes
  - Mean boiling point
  - Aromatic content
- Four bins for solvents containing only aromatic hydrocarbons
  - Boiling range

Calculating Product Weighted MIR



Contents	Weight Fraction	MIR	Weighted Reactivity
Acetone	0.300	0.43	0.129
Toluene	0.150	3.97	0.596
Propane	0.200	0.56	0.112
Xylenes	0.050	7.37	0.369
Butane	0.200	1.33	0.266
Solids	0.100	0	0.000
Total	1.000		1.472

Product-Weighted MIR = 1.47 g O3/g product

Typical Limits

- 36 different categories
- “General Coatings”
  - Non-flat paints: 1.40 g O_3/g product
- “Specialty Coatings”
  - Autobody primer: 1.55 g O_3/g product

Other Provisions

No VOC Exemptions

- Mass-based regulation
  - VOC definition exempts acetone and other low & negligibly reactive compounds
- Reactivity-based regulation
  - Reactivity of low & negligibly reactive compounds accounted for
  - No exemptions (except for resins and other solids)

Prohibition on Use of Toxic Air Contaminants

- Prohibit use of:
  - Trichloroethylene (TCE)
  - Methylene Chloride (MeCl)
  - Perchloroethylene (Perc)

Enforcing the Regulation: Process

- Field inspectors purchase products
- Regulation requires company to be notified of products selected for compliance testing
  - Formulation data to be supplied in 10 days
- Formulation data used to guide laboratory analysis
  - Product speciation using ARB Method 310

Enforcement Challenges

- Extra resource requirements for both ARB and regulated industry
- ARB:
  - Data submittal process
  - Full analysis is resource intensive
  - Continued need to grow ‘library’ of analytes

Enforcement Challenges (cont'd)

- Industry:
  - Need to supply formulation data
    - Data quality must meet higher standard
  - More careful quality control (batch variability)
  - Ingredient 'shopping'
    - Purity of ingredients
    - Substitutions for ingredients

Relating Ozone Reduction to VOC Reduction

Ozone reduction (tons per day) ÷ SWA·MIR of VOCs

= VOC (tons per day)

therefore,

10 tons per day ozone reduction =

~ 3 tons per day VOC reduction

Next Steps for California

- Continue to seek mass reductions when feasible
- Use reactivity to achieve further ozone reductions
- Survey for 2006 sales
- Rulemaking in 2008
  - Consumer product categories
    - Reactivity-based
    - Mass-based
  - Aerosol coatings
  - Update Tables of MIR values

Lessons Learned

- Efficient ozone reductions
- Reactivity approach may not be appropriate for all categories
  - Review categories on a case-by-case basis
- Requires additional resources over mass-based approach
- Provides more flexibility
- Cost-effective

More Information

- Contact:
  - Carla Takemoto: ctakemot@arb.ca.gov
- Websites:
  - http://www.arb.ca.gov/research/reactivity/reactivity.htm
  - http://www.arb.ca.gov/consprod/consprod.htm
  - http://www.arb.ca.gov/consprod/regact/cpwg2008/cpwg2008.htm
  - http://www.arb.ca.gov/consprod/regs/regs.htm