

Potential Approach to Aerosol Coatings Product Regulations in Texas

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Potential Approach to New Aerosol Coatings Product Regulations in Texas

Introduction

The United States Environmental Protection Agency (EPA) has recently designated a 9-county area in the Dallas-Fort Worth (DFW) region of Texas as a “Moderate” nonattainment area for the new 8-hour ozone standards. As a result, the Texas Commission on Environmental Quality (TCEQ) is required to develop a new State Implementation Plan (SIP) that includes a plan for a 15% reduction in emissions of Volatile Organic Compounds (VOC) in the next 6 years. One potential target for reductions is the area emissions from the solvent utilization categories, which fall generally under the 24***** Source Classification Codes (SCC). The SCC’s include seven categories that fall collectively under the general classification of “Consumer and Commercial Products” (CCP). One of those categories is Coatings and Related Products (SCC 2460500000). The National VOC Consumer Products Rule does not include limits on any products in this SCC code. While it is unclear whether ~~or not~~ all products that fall within this category are aerosol coatings products, the vast majority are, and California has set a precedent by regulating “Aerosol Coatings Products”, which fall within this category. According to California’s Air Resources Board (CARB):

- “Aerosol Coating Product” means a pressurized coating product containing pigments or resins that dispenses product ingredients by means of a propellant, and is packaged in a disposable can for hand-held application, or for use in specialized equipment for ground traffic/marketing applications.

Note: This regulation does not cover all Traffic Marking Coatings in California – just those dispensed from aerosol-pressurized small containers.

PCA Services, Inc. was asked to identify potential regulatory approaches to reducing VOC emissions from the solvent utilization categories. This paper gives a brief summary of other relevant Federal and state regulatory activity for the CCP Aerosol Coatings category, and develops a regulatory option for TCEQ’s consideration, along with estimated VOC emissions reductions that may be expected from that option.

Recent History of Aerosol Coatings Products Regulations in the United States

As might be expected because of their substantial ozone nonattainment problems, the California Air Resources Board (CARB) was a leader in developing the early regulations affecting CCP – and the first to regulate Aerosol Coatings. (The CARB, rather than the Air Quality Management Districts, has jurisdiction over CCP in California.) On March 23, 1995, the CARB adopted the first *Regulation to Reduce VOC Emissions from Aerosol Coatings and Amendments to the ACP* (the “Aerosol Coatings Regulation”). The Aerosol Coatings Regulation limited the VOC content for 35 categories of aerosol paints. This aerosol coatings regulation is contained in Title 17, CCR, sections 94520-94528 (<http://www.arb.ca.gov/regact/conspro/cp&acp/cp&acp.htm>).

Subsequently the CARB, in a November 1998 Board hearing, adopted VOC content limits that were more stringent than the existing (1995) limits. These more stringent limits were to become effective on January 1, 2002. However, in the 1998 hearing, recognizing that some of the limits were technologically challenging, the Board directed staff to return to them with an alternative reactivity-based compliance option for aerosol coatings. To that end, staff worked with the affected industry on voluntary reactivity provisions for this regulation.

An alternative regulation was developed and implemented in response to industry concerns that proposed mass-based limit reductions were not practically achievable. Industry had found that the more stringent mass-based limits could be met only by substituting high-solveny aromatic hydrocarbon compounds for other lower-solveny and lower reactivity compounds. Their calculations indicated that on a reactivity-adjusted basis, the reduced mass-based limits would actually increase the ozone-forming potential of the products. ARB agreed with these concerns, and developed a reactivity-based rule that appears to have worked very well. Initial concerns from ARB about enforceability, and from industry about frequent changes requiring numerous reformulations, have not proven to be significant issues.

In June of 2000, the CARB Board adopted an alternative reactivity-based rule designed to have the same ozone reducing potential as the mass-based limits that had been previously adopted in the November 1998 hearing (<http://www.arb.ca.gov/regact/conspro/aerocoat/aerocoat.htm>). The reactivity-based limits became effective in June 2002 for General Coatings and January 2003 for Specialty Coatings. In September 2005, the EPA published a Final Rule that approved the California State Implementation Plan (SIP) including the reactivity-based equivalent emissions reductions, and made other administrative and definitional changes that cleared the way for the CARB rule. (*U.S. EPA. Fed. Reg. 2005, Revisions to the California State Implementation Plan and Revision to the Definition of Volatile Organic Compounds (VOC)—Removal of VOC Exemptions for California’s Aerosol Coating Products Reactivity-Based Regulation. 70, No. 176, 53930*). Currently there is ongoing discussion between EPA and interested industry groups about the possibility of a National Aerosol Coatings Rule that would be very similar to the CARB reactivity-based rule. There

appears to be general agreement on moving ahead to that end in the near future, though many details still need resolution.

Further discussion about the reactivity-based rule is beyond the scope of this report. However, if TCEQ has interest in this option, detailed background and/or technical information, or other support can be provided. The CARB Staff's Initial Statement of Reasons supporting the reactivity-based rule (<http://www.arb.ca.gov/regact/conspro/aerocoat/aerocoat.htm>) is recommended reading for anyone who desires to learn more about the background of, reasons for, and technical details of the reactivity-based rule. The 22-page Executive Summary will be sufficient for most readers.

Potential Option

The Option presented for the Aerosol Coatings subcategory of Consumer and Commercial Products is to adopt a rule identical in substance to the CARB 2000 Aerosol Coatings Rule.

Table 1 (Appendix), entitled Aerosol Coatings Products VOC Limits Worksheet, summarizes the three iterations of the CARB Aerosol Coatings CCP Regulations (as of Dec. 2005).

1. Initial mass-based limits, effective Jan 1996
2. More stringent mass-based limits that had been set to become effective Jan 2002
3. Reactivity-based limits that replaced the 2002 mass-based limits.

Total Emissions Reductions Expected

The EPA-recommended total VOC Emissions Factor (EF) for the Aerosol Coatings category is 0.95 lb/p/yr (March 2005 version of 2002 NEI Documentation); and TCEQ has adopted that factor for calculating the 2002 SIP baseline for the aerosol coatings category. By comparison, California's projected 2005 (post-rule) EF for the same category is 0.373lb/p/yr. These "before" and "after" emissions factors match up very well with California's SIP commitment of a 60% reduction from the pre-control (1990) baseline by 2005: $(0.95-0.373)/0.95 = 60.7\%$ reduction.

If Texas were to adopt the CARB Aerosol Coatings Rule as-is, it is reasonable to expect that Texas' post-Rule EF would be substantially the same as California's. Thus, if one assumes that both the EPA and the CARB EFs are correct, the emissions reductions to be expected from adoption of a similar rule in Texas are:

$$\text{Emissions reduction} = EF_{\text{pre-rule}} - EF_{\text{post-rule}} = 0.95 - 0.373 = \mathbf{0.577 \text{ lb/p/yr}}$$

This is substantially larger than the "Rangefinding" EF we calculated earlier. That preliminary estimate was conservatively based on the CARB estimate of 0.067 lb/p/yr for only the most recent phase of their Aerosol Coating Rule.

Because compliance is by way of product reformulation, the Rule Effectiveness (RE) can be assumed to be 100%, and we think a Rule Penetration (RP) value of 100% is also appropriate for this industry. Thus, the Control Efficiency (CE) can be calculated as follows:

$$EF_{\text{post rule}} = EF_{\text{pre rule}} [1-CE*RP*RE]$$

$$0.373 = 0.95[1-CE*1*1]$$

$$CE = 1 - 0.373/0.95 = 0.607, \text{ or } 60.7\%$$

The following should be noted: Although it isn't explicitly stated, the EPA-recommended EF would seem to assume "no controls" on aerosol products in most of the U.S., neglecting the possibility that reformulated products based on the CARB rule have already found their way into other states, including Texas. It is possible, therefore, that when (and if) a rulemaking process is initiated for a National Aerosol Coatings Rule, EPA might reconsider (lower) their 2002 Guidance for the category, thus impacting the relevant emissions reductions. That possibility should be factored into any SIP commitment for the Aerosol Coatings Category.

Cost Estimate:

Because adoption of these regulations has not been done in a single step before, we were not able to find an estimated cost for the overall change from "no controls" to the post-reactivity-based rule. However, CARB estimated that the cost to formulators for adopting the 2000 reactivity-based rules would be less than \$2/lb (http://www.arb.ca.gov/regact/conspro/aerocoat/chapter_11.pdf). This is an industry

dominated by large producers, and because national producers of aerosol coatings products have already had experience with this type of reformulation, the cost to them should be quite low. At this time the potential effect on small local or regional producers is not easily assessed.

Conclusion

The California Air Resources Board (CARB) is the first state or regional entity to regulate Aerosol Coatings. The first CARB rule issued March 23, 1995, was a mass-based regulation. The second CARB rule, issued in November 1998, established VOC content limits (effective in January 2002) that were more stringent than the existing (1995) limits. Industry voiced concerns that the proposed mass-based limit reductions were not practically achievable, Industry's calculations indicated that on a reactivity-adjusted basis, the reduced mass-based limits would actually increase the ozone-forming potential of the products. CARB subsequently developed a reactivity-based rule that appears to have worked successfully. Therefore at this point there appears to be little precedent for a mass-based rule for aerosol coatings that would serve the purpose of decreasing ozone forming potential from this class of products. One option for Texas is to adopt a rule similar to the CARB 2000 reactivity-based Aerosol Coatings Rule.

Appendix

**Table 1
Aerosol Coatings Products VOC Limits Worksheet**

<u>Effective Date</u>	% VOC by weight		PWMIR*
	8/96	1/02	6/02 – 1/03
<u>Aerosol Coating Category</u>			
General Coatings			<u>6/02</u>
Clear Coatings	67.0	50.0	1.54**
Flat Paint Products	60.0	40.0	1.21
Fluorescent Coatings	75.0	60.0	1.77
Metallic Coatings	80.0	65.0	1.93
Nonflat Paint Products	65.0	45.0	1.40
Primers	60.0	40.0	1.11
Specialty Coatings			<u>1/03</u>
Art Fixatives or Sealants	95.0	60.0	1.80
Auto Body Primers	80.0	45.0	1.57
Automotive Bumper and Trim Products	95.0	75.0	1.75
Aviation or Marine Primers	80.0	70.0	1.78
Aviation Propeller Coatings	84.0	70.0	1.78
Corrosion Resistant Brass, Bronze, or Copper Coatings	92.0	70.0	1.78
Exact Match Finishes:			
Engine Enamel	80.0	50.0	1.72
Automotive	88.0	50.0	1.77
Industrial	88.0	70.0	2.07
Floral Sprays	95.0	70.0	1.68
Glass Coatings	95.0	65.0	1.42
Ground Traffic/Marking Coatings	66.0	45.0	1.18
High Temperature Coatings	80.0	60.0	1.83
Hobby/Model/Craft Coatings:			
Enamel	80.0	70.0	1.47
Lacquer	88.0	70.0	2.70
Clear or Metallic	95.0	80.0	1.60
Marine Spar Varnishes	85.0	60.0	0.87
Photograph Coatings	95.0	70.0	0.99
Pleasure Craft Finish Primers, Surfacer or Undercoaters	75.0	55.0	1.05
Pleasure Craft Topcoats	80.0	55.0	0.59
Shellac Sealers:			
Clear	88.0	70.0	0.98
Pigmented	75.0	60.0	0.94

*Product-Weighted MIR in Grams Ozone per Gram Product (g O₃ / g product)

** The PWMIR values in the 4th column were calculated by the CARB to have equivalent ozone-reduction potential to the % VOC Limits they replaced in the 3rd column.

Table 1 (Contd.)

Aerosol Coatings Products VOC Limits Worksheet

	% VOC by weight		PWMIR*
	8/96	1/02	6/02 – 1/03
Aerosol Coating Category			
Shellac Sealers (contd.):			
Slip-Resistant Coatings	80.0	60.0	2.41
Spatter/Multicolor Coatings	80.0	55.0	1.07
Vinyl/Fabric/Leather/ Polycarbonate Coatings	95.0	70.0	1.54
Webbing/Veil Coatings	90.0	80.0	0.83
Weld-Through Primers	75.0	50.0	0.98
Wood Stains	95.0	75.0	1.38
Wood Touch-Up, Repair or Restoration Coatings	95.0	90.0	1.49

*Product-Weighted MIR in Grams Ozone per Gram Product (g O₃ / g product)

** The PWMIR values in the 4th column were calculated by the CARB to have equivalent ozone-reduction potential to the % VOC Limits they replaced in the 3rd column.