TECHNICAL REVIEW GROUP'S PROPOSED ARCHITECTURAL COATINGS SUGGESTED CONTROL MEASURE

ARB Staff Report

State of California
Air Resources Board
Stationary Source Division

April 20, 1989

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To be heard by the Air Resources Board May 12, 1989 at

Lincoln Plaza
Auditorium
400 P Street
Sacramento, CA

Air Resources Board
P. O. Box 2815
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OVERVIEW AND RECOMMENDATIONS

A. OVERVIEW

The purpose of this report is to present and discuss the proposed suggested control measure for architectural coatings approved by the Technical Review Group (TRG). A copy of the proposed suggested control measure is contained in the Appendix. The suggested control measure is based on the architectural coating model rule approved by the Air Resources Board (ARB) in 1977, adopted subsequently in various forms by local air districts, and revised by the TRG in 1985. To be consistent with present terminology, the proposed amended model rule is referred to as a suggested control measure (SCM).

The model rule, as approved in 1977 and revised in 1985, formed the basis for architectural coatings rules in effect in 24 air pollution control districts and air quality management districts in the state. These rules have achieved emission reductions by setting standards for the volatile organic compound (solvent) content of coatings. Unfortunately, the standards set in the various district rules are not uniform statewide. This makes it difficult to manufacture and sell paints in more than one district, and difficult to enforce the regulations. Also, the model rules, and the district rules based on them, exempt several kinds of coatings.

The SCM contained in this report was developed by the Architectural Coatings Committee of the TRG which consists of representatives from the Air Resources Board, Environmental Protection Agency, the South Coast and Bay Area Air Quality Management Districts (AQMD), and the San Diego County and Ventura County Air Pollution Control Districts (APCD). The committee was established by the Technical Review Group in 1986 to review and update the 1985 version of the model rule.

The TRG recognizes that emissions from architectural coatings represent a significant source of hydrocarbon emissions and that the adoption of regulations based on the SCM would only reduce emissions by a fraction on the total emissions from this source. As such, the TRG views this proposed SCM as necessary to further reduce emissions but only as an interim step in achieving further reductions. The TRG has committed

itself to working with the coatings industry to identify additional opportunities for further emission reductions from architectural coatings. Several approaches for achieving this reduction are identified in this report.

1. Objectives of the proposed suggested control measure

The committee established several objectives for consideration in amending the model rule including:

1) improving the clarity and enforceability of the rule by amending definitions and adding administrative requirements,

2) providing a basis for uniformity among district architectural coatings rules,

3) establishing emission limits for previously exempt specialty coatings,

4) revising the existing emission limits for several specialty coatings, to achieve additional emission reductions by taking advantage of new developments in technology.

2. Categories of coatings

The two main categories of architectural coatings are: 1) flat and non-flat coatings and 2) specialty coatings. The proposed SCM affects the specialty coatings.

The flat and non-flat coatings categories account for almost 30 percent of the volatile organic compound (VOC) emissions from architectural coatings. Districts rules have required flat and non-flat coatings to meet a standard of 250 grams of VOC per liter (g/l) for two years. Flat and non-flat coatings which meet these limits are essentially all low-VOC, water-borne formulations. The ARB staff believes that current district regulations generally reflect "reasonably available control technology" for flat and non-flat coatings. Further reductions in emissions from flat and non-flat coatings will require substantial product development over a number of years. For this reason, the committee directed its efforts toward specialty coatings which account for the remaining 70 percent of the volatile organic compound emissions from architectural coatings.

The specialty coating category is divided into 27 smaller coating categories such as clear wood finishes, stains and preservatives, primers, sealers and undercoaters and industrial maintenance coatings. Specialty coatings tend to be solvent-borne coatings with higher VOC content than the flat and non-flat coatings. Table 1 lists the 27 specialty coatings categories which were reviewed by the committee.

Table 1

Architectural Coatings
Specialty Coating Categories

Below Ground Wood Preservatives

Bond Breakers

Clear Wood Finishes

Concrete Curing Compounds

Dry Fog Coatings

Fire Retardant Coatings

Form Release Compounds

Graphic Arts Coatings

Industrial Maintenance

Magnesite Cement Coatings

Mastic Textured Coatings

Metallic Pigmented Coatings

Multi-Colored Coatings

Opaque Stains

Pre-Treatment Wash Primers

Primers, Sealers and Undercoaters

Quick-Dry Enamels

Quick-Dry Primers, Sealers and Undercoaters

Roof Coatings

Semi-Transparent Stains

Shellac

Specialty Flat

Swimming Pool Coatings

Tile-Like Glaze

Traffic Paints

Waterproofing Sealers

Wood Preservatives

3. Emissions from architectural coatings

Statewide emissions from architectural coatings are estimated to have been 154 tons per day in 1984. Architectural coatings account for approximately 8 percent of the statewide non-vehicular emissions. Preliminary estimates of 1987 emissions from architectural coatings are 185 tons per day, an increase of about 17 percent from 1984.

The overriding factor resulting in this increase in emissions is the growth in population during this time and the corresponding increase in the use of architectural coatings. The increase in emissions took place in spite of the implementation of lower VOC standards for coatings.

In the 1985 model rule, VOC limits for specialty coatings were to be effective September 1, 1989. The majority of the 24 districts with architectural coatings rules adopted this effective date for the specialty coatings VOC limits. However, the three largest districts in the state required compliance earlier. The South Coast Air Quality Management District, and the Bay Area Air Quality Management District adopted an effective date of September 1, 1987 and the San Diego County District adopted an effective date of December 1, 1987.

In the 3 largest districts, some manufacturers were unable to develop complying coatings and withdrew from these markets. However, in most cases adequately performing, complying coatings have been developed.

The SCM has the same compliance dates and standards for specialty coatings as the 1985 model rule. However, the SCM establishes standards for additional specialty coatings categories which were previously exempt. Adopting standards for previously exempt specialty coatings will provide emission reductions to help offset the impact of growth on emissions.

The standards to be effective in the near term (September 1989) are proposed to bring the previously exempt coatings under regulation at limits which are achievable by most, if not all manufacturers. The future effective standards or technology-forcing limits are intended to result in additional emission reductions. The TRG intends to re-evaluate the technology-forcing limits prior to September 1992 to determine if the limits are still appropriate. Also at that time, it would be decided if technology would permit additional emission reductions to be achieved.

4. The need for uniformity

Over the last several years, a major concern of ARB staff has been the uniformity among districts' architectural coating rules. From an environmental perspective, architectural coatings are unique from the more traditional sources of air pollution. Architectural coatings are manufactured in one place, distributed widely throughout the state, and applied in even more dispersed locations. Unlike traditional point sources, air emissions occur not where the coatings are manufactured, but where the coatings are applied. This mobility means that rules will be most effective when they are uniform throughout the state.

From an industry perspective, it is important for certain types of rules to be essentially consistent from district to district. Of most concern, are technology-forcing requirements imposed on products such as architectural coatings which are distributed to consumers, industrial and commercial users statewide. Owing to our uniquely severe air quality problem, we must continue to ask suppliers of these products to develop special "low-polluting" formulations for the California market. Given the size of the California market, it will be cost-effective for manufacturers of most architectural coatings to meet our challenge. To the extent they succeed, our air quality will improve and the individuals and businesses that depend on these products can continue to operate competitively in our state. However, it is not reasonable to expect architectural coating manufacturers to develop several different formulations for California alone. Therefore, consistency among rules becomes both an environmental and an economic necessity.

For this reason, it would be appropriate for the Board to strongly recommend that districts adopt uniform architectural coatings rules. Also, we have been working with the local districts through the TRG and the California Air Pollution Control Officers Association's (CAPCOA) board of directors. The CAPCOA membership has taken the position to use the SCM as a model to develop statewide, uniform rules. The president of CAPCOA sent a letter, dated December 19, 1988, to the CAPCOA members encouraging them to work with the TRG in developing the Architectural Coating Suggested Control Measure presented in this report. Also, in recognition that uniformity is not just a California issue but an issue that goes beyond state borders, the Northeastern States for Coordinated Air Use Management (an organization of eight northeastern states) has communicated to us a desire to have rules that are uniform with California's requirements.

5. Development of the suggested control measure

To develop the suggested control measure, the Architectural Coating Committee conducted research into the availability and performance of low-VOC specialty coatings and consulted extensively with industry representatives. Thirty-two revisions to the 1985 model rule were proposed. The proposed revisions were discussed with industry at three public workshops held in San Francisco, Los Angeles, and Sacramento. Over 400 persons attended the workshops, and additional input was received in the form of written comments including over 120 letters.

During development of this suggested control measure, it became apparent that for many of these specialty coatings categories, achieving further emission reductions from conventional "command and control approaches" will be difficult. For architectural coatings and other coatings regulations, non-traditional approaches, such as economic incentives, seem to present a promising approach to promote further development of low-VOC alternatives. At this time, the districts and the ARB lack the authority to adopt such regulations. However, the ARB staff will further develop this concept for achieving additional emission reductions in emissions from architectural coatings in the future.

Other issues which were discussed by the committee included the need for future sales and usage surveys, the impact of technology-forcing standards and opportunities for future emission reduction.

Detailed information supporting the development of the proposed architectural coatings suggested control measure is contained in the technical support document entitled, "Proposed Suggested Control Measure for the Control of Volatile Organic Compound Emissions from Architectural Coatings."

B. RECOMMENDATIONS

We recommend that the Board:

1. Approve the proposed suggested control measure for architectural coatings,

2. Direct the Executive Officer to transmit this SCM to districts and strongly urge the districts to adopt uniform regulations consistent with the SCM.

I.

PROPOSED SUGGESTED CONTROL MEASURE

The proposed suggested control measure includes 9 administrative proposals and 23 changes to the definitions or standards of the existing model rule. The proposed revisions establish standards for previously exempt specialty coatings and make more restrictive standards in several specialty coating categories where technology has improved. The proposed revisions also improve the clarity and enforceability of the rule by amending definitions and adding administrative requirements. The proposed amendments are summarized below in Sections A, B, and C, and in Tables 2 and 3.

For most of the proposed changes, the committee was able to come to mutual agreement with industry; however, there were several areas where we did not reach agreement. These are briefly discussed in Section II. "Issues".

A. DEFINITIONS

The proposed amendments to definitions include 7 new definitions, elimination of 5 existing definitions, and 13 changes to existing definitions.

B. STANDARDS

The proposed amendments to standards include new VOC standards for 12 previously exempt and 5 new specialty coating categories. More restrictive VOC standards for 3 pre-existing specialty coating categories are also proposed. Table 2 identifies both the existing and proposed standards for the specialty coatings categories.

C. ADMINISTRATIVE REQUIREMENTS

The committee has proposed the addition of 8 and the elimination of 1 administrative requirements. These administrative proposals are summarized in Table 3. Two of these proposals (Labeling and Rule Effective Date) have been the subject of lengthy debate and are further discussed in Section II.

Table 2

Summary of Proposed Changes to VOC Standards grams/liter

Category	1988 Model Rule	Proposed SCM Effective 9/1/89	Future Effective Dates	
Below Ground Wood Preservatives	Exempt	600	350 (9/1/92)	
Bond Breakers	None	750	350 (9/1/96)	
Clear Wood Finishes				
— Lacquers	680	680	550 (9/1/96)	275 (9/1/94)
- Varnishes	350	350		
Concrete Curing Compounds	350	350		
Dry Fog Coatings	Exempt	400		
Enamel Undercoaters	450	350		
Fire Retardent Coatings	Exempt			
Clear	None	650		
Pigmented	None	350		
Form Release Compounds	None	250		
Graphic Arts Coatings	Exempt	500		
Industrial Maintenance (IM) Coatings	420	420	340 (9/1/92)	
High Temperature IM	None	650	550 (9/1/92)	420 (9/1/94)
Magnesite Cement Coatings	None	600	450 (9/1/92)	
Mastic Texture Coatings	Exempt	300		
Metallic Pigmented Coatings	Exempt	500		
Multi-color Coatings	Exempt	575	420 (9/1/92)	
Opaque and Semi-transparent Stains and Wood Preservatives	350	350		
Pre-treatment Wash Primers	None	780	420 (9/1/94)	
Primer, Sealer & Undercoaters	350	350		
Quick-Dry Enamels	400	250		
Quick-Dry Primer, Sealers & Undercoaters	Exempt	350		
Roof Coatings	300	300		
Specialty Flat Coatings	400	250		
Shellac	Exempt			
Clear	None	730		
Pigmented	None	550		
Swimming Pool Coatings	Exempt	650	340 (9/1/92)	
Swimming Pool Repair Coatings	None	650	340 (9/1/97)	
Tile-Like Glaze	Exempt	420		
Traffic Paints	250	250		
Waterproofing Sealers	400	400		

Notes:

For those categories that have been consolidated with existing categories (eg. Quick-Dry Enamels, Quick-Dry Primers, Sealers & Undercoaters, Enamel Undercoaters, Tile-Like Glaze and Specialty Flat), the proposed standards are those for the respective categories into which the coatings now belong.

Categories with the designation "None" under Model Rule, are new categories proposed in the SCM.

Table 3

Summary of Administrative Proposals

Proposal	Description
Architectural Coatings Survey (To determine actual usage of various products)	Annual Shellac Survey Annual Quarts Survey Every Other Year Survey of all coatings Every Other Year Survey of Aerosol Coatings
Labeling VOC Content	VOC Content required to be displayed on coating container.
Most Restrictive VOC Limit	Coatings required to meet the most restrictive standard based on manufacturers labeling and advertising statements.
On-Site Coating of Uninstalled Appurtenances	Clarifies when other rules such as metal parts or wood products apply.
Prohibition of Solicitation	Prohibits specifying non-complying coatings by oral or written contracts.
Rule Effective Date	Gives two years for retailers to clear out stock.
Small Business Exemption	Eliminates expired (1984) small business exemption.
Storage of VOC Containing Material	Requires proper storage of coatings and clean-up materials
VOC Definition	Modifies definition of VOC.

II.

ISSUES

Throughout the process of developing the suggested control measure, industry representatives expressed concern over certain technical and administrative issues. For most of the proposed changes, the committee was able to come to mutual agreement with industry; however, there were several areas where a suitable agreement was not achieved. These are briefly discussed below. Additional information supporting the committee's action regarding these issues is contained in Chapter VII of the technical support document.

A. TECHNICAL ISSUES

Industry believes that there are needs for certain kinds of coatings which cannot currently meet low-VOC limits. Industry concerns center around two principal issues: performance (including application characteristics) and costs. We have been told that low-VOC coatings for several applications do not perform as well as high-VOC coatings and have different, undesirable application properties, such as longer drying times, or the need for more thorough surface preparation. The coatings categories where these issues appear to be of most concern are: primers, sealers, and undercoaters; quick-dry enamels; clear wood finishes; and swimming pool coatings.

In the area of industrial maintenance coatings, industry has expressed concern over the lack of a provision in the rule to allow partial recoating of structures already coated with vinyl-chloride or chlorinated rubber coatings. Without these coatings to repair such structures, existing coatings must be removed entirely before applying complying coatings.

The committee recognizes that industry has concerns on the availability of complying coatings; however, the committee found that there are complying coatings available for each category. We do agree, that in some cases, the use of lower-VOC coatings may require more surface preparation than was necessary with the higher VOC resin systems. However, technology is advancing rapidly to mitigate these problems encouraged in part by air pollution regulations. The committee understands that implementation of the suggested control measure will require both advances in coatings

technology and changes in application practices. The committee believes these changes are necessary for emission reductions.

B. ADMINISTRATIVE ISSUES

The two primary administrative issues of concern to industry were container-labeling requirements and the prohibition of sale of "pre-manufactured" non-complying coatings.

Industry is concerned that labeling requirements will not be consistent among various jurisdictions. The cost of re-labeling and the limited space on a label are also concerns of the industry. The committee concurs that labeling requirements are an important concern. However, identifying the VOC content of coatings will assist in the enforcement of the VOC limits. Adoption of the suggested control measure by districts will provide uniform labeling requirements at least within California.

Industry is also concerned that significant fines may result from "pre-manufactured" non-complying coating inadvertently remaining in stock after the effective date of prohibition of sale. The committee has altered its proposal so that the rule provides two years for retail outlets to clear "pre-manufactured" non-complying coatings from stock. This should be sufficient time to clear non-complying coatings from inventory. Also, in determining the penalties for a violation, the committee recommends that districts take into consideration the circumstances and severity of the offense.

III.

EMISSION ESTIMATES

Architectural coatings are formulated with a variety of components including pigments, resins, solvents, and different additives such as driers, anti-skinning agents, anti-sag agents, dispersing agents, defoaming agents, preservatives, and fungicides. The primary source of VOC emissions from architectural coatings is the solvent component. The major categories of solvents used in coatings are: terpene solvents, hydrocarbon solvents (aliphatic, aromatic, naphthenes, olefins, and chlorinated solvents), and oxygenated solvents (alcohols, ketones, esters, and acetates).

As shown in Figure 1, statewide emissions from architectural coatings are estimated to have been 154 tons per day in 1984, representing approximately 18 percent of all VOC emissions from solvent-use sources. This emission estimate is based on the 1984 ARB Architectural Coatings Survey conducted by ARB staff to determine the volumes and VOC content of architectural coatings sold in California during 1984. Preliminary estimates by the ARB Emissions Inventory staff indicate that emissions from architectural coatings increased to 185 tons per day in 1987. This represents a 17 percent increase in emissions between 1984 and 1987. This emission increase takes into consideration emission reductions due to lower VOC limits in 5 specialty coatings categories which became effective in most districts in September 1984. It also takes into consideration emission reduction associated with lower VOC limits for industrial maintenance and non-flat coatings which became effective in the South Coast, San Francisco Bay Area, and the San Diego air basins between September 1986 and September 1987. We estimate, based on population, that about 80 percent of the emissions from architectural coatings occur in the above mentioned three air basins.

SOLVENT USE CATEGORIES AND ASSOCIATED EMISSIONS FOR 1984

TONS/DAY

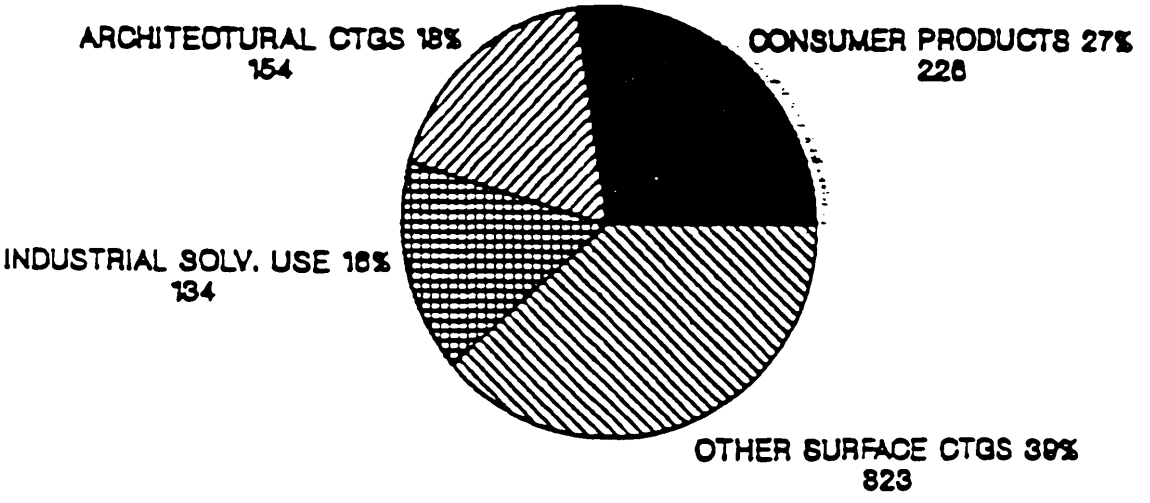

FIGURE 1

Source: ARB Emission Inventory

IV.

IMPACTS

A. EMISSION REDUCTIONS

Estimated emission reductions associated with the proposed suggested control measure are given in Table 4. Statewide reduction of VOC emissions that could be realized if the proposed SCM is adopted by the districts are estimated at 3,200 tons per year (8.8 tons per day) by 1990 upon statewide adoption of the standards. An additional 1800 tons per year (4.8 tons per day) by 1994 will be realized when the technology-forcing limits become effective. The emission reductions to be achieved in 1990 by implementation of the suggested control measure represent about 6 percent of the total emissions from all architectural coatings(154 tons per day), and about 9 percent in 1994. The emission reductions to be gained are limited by the available coatings technology. Future emission reductions will depend on improvements in technology or the ability of regulators to develop innovative regulatory approaches.

The estimated emission reductions are conservative since emission reductions due to changes in solvent clean up and thinning that would occur from a switch to water-based coatings was not considered in the calculations. Also, the reduction estimates are based on the assumption that compliance will be achieved by reformulating existing coatings to the proposed standard. It is possible and very likely that in many cases reformulation will result in coatings with VOC contents much less than the proposed standard.

To adequately monitor emission reductions from implementation of architectural coating rules, the ARB staff will conduct periodic surveys on the sales volumes and VOC content of architectural coatings sold in California. The surveys are expected to be started in fiscal year 1989-90.

Table 4
Estimated Statewide Emission Reductions
for Specialty Coatings Categories

Coating Category	VOC Limits g/l 9/1/89	1984 Estimated Statewide Emissions Tons/Year	Estimated Emission Reductions 1990 Tons/Year	VOC Limits g/l 9/1/92	Estimated Emission Reductions Tons/Year
Roof Coatings	300	3,331	318		
Metallic Pigmented Coatings	500	89	2		
Primers, Sealers & Undercoaters	350	2,552	400		
Enamel Undercoaters (Consolidate with P, S & U)	250	800	40		
Quick-Dry Primers, Sealers & Undercoaters (Consolidate with P,S & U)	350	495	185		
Specialty Flat (Consolidate with P, S & U)	350	88	13.8		
Industrial Maintenance (IM)	420	5,885	712	340	813
Clear Wood Finishes - Varnish	350	2,815	850		
- Lacquer	680	5,818	24	550	610
Previous Exempt Categories					
Below Ground Wood Preservatives	350	4	0.2	350	2
Bond Breakers	800	444	8.8	350	185
Dry Fog Coatings	400	116	7.2		
Fire Retardant Coatings	650	14	<0.1		
Graphics Arts	500	92	<0.1		
Mastic Texture Coatings	300	405	16		
Multi-Colored Coatings	500	200	32	420	45
Shellac - Clear	730	104	<0.1		
- Pigmented	550	111	0.9		
Swimming Pool Coatings	650	181	8	340	74
Tile-Like Glaze (Consolidate with IM)	420	41	8	340	4.3
Quick Dry Enamels (Consolidate with Non-Flat)	250	845	200		
Wood Preservatives	350	1,441	150		
Stains	250	1,224	495		
		Total: 25,845 (81 tons/day)	3,223 (8.8 tons/day)		1,741 (4.8 tons/day)

Notes

Assumes VOC content reduced to, but not below, new standards; does not consider clean-up solvent reductions.

P, S & U = Primers, Sealers and Undercoaters

B. ENVIRONMENTAL IMPACTS

The committee has identified no adverse environmental impacts associated with implementation of this suggested control measure. With the exception of methyl chloroform (1,1,1-trichloroethane), no increases in the use of halogenated hydrocarbons in coatings were identified. Methyl chloroform is listed as a non-photochemically reactive compound, and, as such, is available to be used as a substitute to replace photochemically reactive compounds in coatings. Methyl chloroform is on the ARB's list of compounds for future consideration as a toxic air contaminant but has not been identified by the ARB as a toxic air contaminant. Presently, not enough health data are available to allow an evaluation. No impacts on global warming were identified. There may be some worker-safety issues associated with the proposed control measure caused by a shift in coating types. They will be mitigated by changes in application techniques involving use of safety equipment.

C. ECONOMIC IMPACTS

To comply with the proposed VOC limits, manufacturers basically have two options: (1) replace non-complying coatings with existing complying coatings, or (2) reformulate the coatings. Replacing non-complying coatings with complying coatings is often more cost-effective than reformulation because there is minimal research and development involved. Based on the 1984 marketing survey, the option to replace rather than reformulate non-complying coatings is available for many of the coating categories where standards have been made more stringent. Thus, we expect little, if any, economic impact to the consumer from the proposed limits if coating manufacturers replace non-complying coatings with existing complying coatings.

The economic impact to consumers from reformulating coatings can be either positive or negative and is difficult to estimate. In previously exempt coating categories, the committee established limits which may be met by the majority of existing coatings. In these categories the cost of implementing the suggested control measure should be negligible. For the few categories where significant changes in the standards are proposed, we estimate cost-effectiveness for reformulation to range between -$4.30 and $6.40 per pound of VOC reduced. The upper end of this range is high relative to VOC measures adopted in the past. But VOC control is becoming increasingly expensive, particularly for coatings. In comparison, the South Coast AQMD has approved a Wood Products Coatings rule (1136) where the estimated cost of control ranges from $2.00 to $7.90 per pound of VOC reduced. The South Coast AQMD has also adopted an Automobile Refinishing rule (1168) where the estimated cost of control is $3.50 per pound of VOC reduced.

V.

RULE EFFECTIVENESS ISSUES

A. TECHNOLOGY-FORCING STANDARDS

The proposed SCM is technology-forcing for some limits on some categories. Careful use of technology-forcing regulatory provisions is essential in California if progress is to continue toward attainment of air quality standards. But such provisions do pose a regulatory risk for both affected industry and California air pollution control agencies when they are submitted to EPA for inclusion in the State Implementation Plan (SIP).

Once EPA approves a state or local regulatory provision as part of the SIP it is considered by them to be a binding commitment to achieve the expected emissions reduction on the schedule indicated. If, as sometimes occurs with technology-forcing rules, the reductions are not achieved, EPA holds the affected sources, local districts and the state accountable. EPA will not approve a relaxation of a technology-forcing provision unless a substitute emission reduction measure is provided that achieves the same level of reductions that was scheduled to occur from the original technology-forcing provision. If this condition for relaxation is not met, EPA can enforce the original provision on affected sources and, if they believe the air district and state agency are not diligently pursuing the matter, impose various sanctions. Citizen suits are also possible if SIP commitments are not met.

As noted, the TRG's proposed suggested control measure contains several technology-forcing solvent limits. These limits have elicited concern from industry and from districts. Both have requested some assurance that if standards are not achievable despite diligent efforts by industry, technology-forcing standards can be renegotiated.

Basically, there are two options available. The technology-forcing provisions can be submitted to EPA and all parties can assume the inherent risk and comply with EPA policies. Alternatively, the technology-forcing provisions can be adopted by districts, but withheld from the SIP. The second option is being carefully explored.

B. FUTURE EMISSION REDUCTIONS

Coatings technology has made significant advances over the last 10 years. We anticipate even more rapid changes in coatings technology over the next 5 to 7 years.

To maximize the emission reductions from architectural coatings, we need to closely follow improvements in technology. Lower VOC-coatings offer the best option in the short term for slowing the growth of emissions from architectural coatings. New coatings application techniques, such as high efficiency spray, need to be examined. Opportunities may also exist to reduce emissions by encouraging pre-coating of architectural components in the shop where air pollution control equipment may be used. Non-traditional approaches, such as economic incentives, need to be examined to encourage additional innovation.

Table 5 identifies several areas where we believe additional emission reductions may be available in the next several years.

The TRG has committed itself to working with the coatings industry to identify opportunities for further emission reductions from architectural coatings. The TRG intends to re-evaluate this suggested control measures and bring forward amendments if appropriate. The ARB staff supports and will participate in this effort. Also, as part of this effort, we will work with the TRG to develop a new definition for volatile organic compounds. The new definition will incorporate requirements of photochemical smog, toxic air contaminant, global warming, and upper stratospheric ozone programs. This new definition will facilitate maximizing environmental benefits of these programs.

Table 8

Options for Future Emission Reductions

Category/Area	Emission Reduction Options
Improved Application	Require high transfer efficient spray Techniques— equipment such as high volume low pressure (HVLP) systems, to apply architectural coatings
Primers, Sealers & Undercoaters	Water based technology currently offers many coatings with VOC in the 100 g/l range. It may be possible to significantly reduce the VOC limits for this category.
Fire Retardent	Water based technology and new resins Coatings should allow for the formulation of low VOC fire retardent coatings in the next three to five years.
Industrial Maintenance Coatings	Technology is moving rapidly in this area. Extreme performance coatings at or below 250 g/l should be available for most applications in the next 5 to 10 years.
Clear Wood Finishes	Improved water based technology and a shift toward prefinished materials should provide significant emission reductions in this category over the next 5 to 7 years.
Shellac	Pigmented shellacs should be able to be reduced from 55(to 450 g/l within the next 3 years. Also, work on wate borne shellacs may offer further reductions in the next 5 years.
Metallic Pigmented Coatings	For most applications we believe water based or 2 component coatings will allow the VOC conten of these coatings to be reduced to below 350 g/l.
Graphic Arts Coatings	Resin manufacturers have not put too much effort into the development of low VOC graphic arts coatings. However, this trend seems to be changing. We believe the VOC content in this category can be reduced to 350 g/l in the next 5 years.
High Temperature Industrial Maintenance	High temperature coatings in the 550 g/l range are currently being field tested. New 100% solid silicone resins are being advertised. Coatings with VOC content below 400 g/l may be available in the next three years.
Roof Coatings	Increased movement toward high solids and improved application techniques should allow VOC content of coatings in this category to approach 200 g/l.
Clean-Up Solvents	Advances in non-VOC clean-up materials and the increased use of water based coatings should provide significant reduction in solvent use.
Chlorofluorocarbons(CFC)	Investigate the extent to which ozone depleting CFCs ar being used in coatings. Establish a date after which these compounds may not be used.
VOC Definition	Investigate the possibility of improving the definition of VOC to be consistent with requirements of the photochemical smog, toxic air contaminant, globa warming and upper stratospheric ozone programs. Investigate the extent that the revision would result i one need to reduce the use of certain compounds.

C. RULE UNIFORMITY

Because there are currently 24 districts in the state with architectural coatings rules in effect and the rules are not entirely uniform, coating manufacturers have to be aware of and meet their differing requirements. As a practical matter we believe that most manufacturers make coatings to comply with the most restrictive limits and market those coatings statewide. Some do not, however, and take advantage of the less restrictive limits or lack of requirements (17 districts do not have rules for architectural coatings). Since emissions from coatings occur during application and not at purchase, emission reductions may not be achieved because non-complying coatings may be purchased outside a district and brought into the district for use.

For products that are manufactured, for a statewide market, non-uniformity of requirements causes problems with compliance by industry and enforcement by government. Resources have to be expended to manufacture the variety of coatings necessary to meet differing requirements. Resources have to be expended to appropriately distribute and market the products. Each additional expenditure of resources leaves less resources to develop new and hopefully less polluting products. Users need to know what requirements apply in different areas of the state. Similarly, districts' enforcement programs suffer if resources have to be expended to determine point of purchase of coatings.

For the above reasons, ARB staff have been concerned about uniformity of rules and are working with local districts to promote uniformity. Also, ARB staff are exploring the possibility of jointly developing rules for architectural coatings with NESCAUM and member states (New York, New Jersey, Massachusetts, Rhode Island, Connecticut, Vermont, Maine, New Hampshire) to cooperatively develop uniform rules.

D. ECONOMIC INCENTIVES

To date, California's approach to reducing VOC emissions from the application of architectural coatings has included only the establishment of standards and prohibiting the sale of coatings which do not meet them. There are some applications which do not lend themselves to further reductions in this manner, where technology has not developed lower-VOC alternatives to the coatings presently on the market (e.g. clear wood finishes, magnesite cement coatings, semi-transparent stains). In these areas, and in other coatings applications where current standards are above 250 g/l, economic incentives present a promising, way to induce development of low-VOC alternatives to currently available coatings.

1. Approach

Economic incentives might take the form of a fee levied on the solvent content of coatings, or on that portion of the VOC content greater than 250 g/l. This fee would increase annually. Eventually, the prices of high-VOC coatings would reach levels which would provide a strong incentive to shift

to other coatings or to the adoption of new, low-emission practices in the application of coatings for certain jobs. Moreover, the old high-VOC coatings would still be available for those applications where they might be necessary, at a price which corresponds to the air-pollution potential of the coatings.

2. Unresolved issues

Unresolved issues associated with economic incentives include:

- o Neither the ARB nor the districts now have the clear authority to impose economic incentives on architectural coatings.
- o A decision would have to be made on how to use the money collected.
- o The effectiveness of economic incentives would have to be evaluated and demonstrated.
- o A method is needed to determine the appropriate level at which to set fees.

The ARB staff will continue to investigate the feasibility of using economic incentives as an alternative approach to reducing emissions from architectural coatings.

Appendix A

PROPOSED ARCHITECTURAL COATINGS
SUGGESTED CONTROL MEASURE

REVISED 4/21/89

Proposed Architectural Coating Rule

RULE _____ ARCHITECTURAL COATINGS

(a) APPLICABILITY

This rule is applicable to any person who supplies, sells, offers for sale, applies, or solicits the application of any architectural coating, or who manufactures any architectural coating for use within the District.

(b) DEFINITIONS

(1) Appurtenances: Accessories to an architectural structure, including, but not limited to: ~~hand~~ railings, cabinets, bathroom and kitchen fixtures, fences, rain-gutters and down-spouts, window screens, lamp-posts, heating and air conditioning equipment, large fixed stationary tools and concrete forms, mechanical equipment.

(2) Architectural Coatings: Coatings applied to stationary structures and their appurtenances, to mobile homes, to pavements, or to curbs.

(3) Below Ground Wood Preservatives: Coatings formulated to protect below ground wood from decay or insect attack and which contain a wood preservative chemical registered by the California Department of Food and Agriculture.

(4) Bituminous Coatings: Black or brownish coating materials which are soluble in carbon disulfide, which consist mainly of hydrocarbons, and which are obtained from natural deposits or as residues from the distillation of crude oils or of low grades of coal.

(5) Bond Breakers: Coatings applied between layers of concrete to prevent the freshly poured top layer of concrete from bonding to the layer over which it is poured.

(6) Clear Wood Finishes: Clear and semi-transparent coatings, including lacquers and varnishes, applied to wood substrates to provide a transparent or translucent solid film.

(7) Concrete Curing Compounds: Coatings applied to freshly poured concrete to retard the the evaporation of water.

(8) Dry Fog Coatings (Mill White Coatings): Coatings formulated only for spray application such that overspray droplets dry before subsequent contact with other surfaces.

(9) Fire Retardant Coatings: Coatings which have a flame-spread index of less than 25 when tested in accordance with ASTM Designation E-84-87, "Standard Test Method for Surface Burning Characteristics of Building Material", after application to Douglas fir according to the manufacturer's recommendations.

(10) Form Release Compounds: Coatings applied to a concrete form to prevent the freshly poured concrete from bonding to the form. The form may consist of wood, metal, or some material other than concrete.

(11) Graphics Arts Coatings (Sign Paints): Coatings formulated for and applied on-site to indoor and outdoor signs (excluding structural components) and murals, including lettering enamels, poster colors, copy blockers, and bulletin enamels.

(12) High Temperature Industrial Maintenance Coatings: Industrial Maintenance Coatings formulated for and applied to substrates exposed continuously or intermittently to temperatures above 400 degrees Fahrenheit.

(13) Industrial Maintenance Coatings: High performance coatings formulated for and applied to substrates in industrial, commercial, or institutional situations that are exposed to one or more of the following extreme environmental conditions:

(i) immersion in water, wastewater, or chemical solutions (aqueous and non-aqueous solutions), or chronic exposure of interior surfaces to moisture condensation;
(ii) chronic exposure to corrosive, caustic or acidic agents, or to chemicals, chemical fumes, chemical mixtures, or solutions;
(iii) repeated exposure to temperatures in excess of 250 F;
(iv) repeated heavy abrasion, including mechanical wear and repeated scrubbing with industrial solvents, cleansers, or scouring agents; or
(v) exterior exposure of metal structures.

Industrial Maintenance Coatings are not for residential use or for use in areas of industrial, commercial, or institutional facilities such as office space, lunchrooms, and meeting rooms.

(14) Lacquers: Clear wood finishes formulated with nitrocellulose or synthetic resins to dry by evaporation without chemical reaction, including clear lacquer sanding sealers.

(15) Magnesite Cement Coatings: Coatings formulated for and applied to magnesite cement decking to protect the magnesite cement substrate from erosion by water.

(16) Mastic Texture Coatings: Coatings formulated to cover holes and minor cracks and to conceal surface irregularities, and applied in a thickness of at least 10 mils (dry, single coat).

(17) Metallic Pigmented Coatings: Coatings containing at least 0.4 pounds of metallic pigment per gallon of coating as applied.

(18) Multi-Colored Coatings: Coatings which exhibit more than one color when applied and which are packaged in a single container and applied in a single coat.

(19) On-Site Modification: Operations performed at the site of installation to fit an appurtenance to the specific location of its installation, including, but not limited to: cutting, mitering, joining, soldering, welding, or forming.

(20) Opaque Stains: All stains that are not classified as semi-transparent stains.

(21) Opaque Wood Preservatives: All wood preservatives not classified as clear or semi-transparent wood preservatives or as below ground wood preservatives.

(22) Pre-treatment Wash Primers: Coatings which contain a minimum of 12% acid by weight, applied directly to bare metal surfaces to provide necessary surface etching.

(23) Primers: Coatings formulated and applied to substrates to provide a firm bond between the substrate and subsequent coats.

(24) Residential Use: Use in areas where people reside or lodge including, but not limited to single and multiple family dwellings, condominiums, mobile homes, apartment complexes, motels, and hotels.

(25) Roof Coatings: Coatings formulated for application to exterior roofs and for the primary purpose of preventing penetration of the substrate by water, or reflecting heat and reflecting ultraviolet radiation. Metallic pigmented roof coatings which qualify as metallic pigmented coatings shall not be considered to be in this category, but shall be considered to be in the metallic pigmented coatings category.

(26) Sealers: Coatings formulated for and applied to a substrate to prevent subsequent coatings from being adsorbed by the substrate, or to prevent harm to subsequent coatings by materials in the substrate.

(27) Semi-Transparent Stains: Coatings formulated to change the color of a surface but not conceal the surface.

(28) Semi-Transparent Wood Preservatives: Wood preservative stains formulated and used to protect exposed wood from decay or insect attack by the addition of a wood preservative chemical registered by the California Department of Food and Agriculture, which change the color of a surface but do not conceal the surface, including clear wood preservatives.

(29) Shellacs: Clear or pigmented coatings formulated solely with the resinous secretions of the lac beetle (laccifer lacca), thinned with alcohol, and formulated to dry by evaporation without a chemical reaction.

(30) Solicit: To require for use or to specify, by written or oral contract.

(31) Swimming Pool Coatings: Coatings formulated and used to coat the interior of swimming pools and to resist swimming pool chemicals.

(32) Swimming Pool Repair Coatings: Chlorinated rubber based coatings used for the repair and maintenance of swimming pools over existing chlorinated rubber based coatings.

(33) Traffic Coatings: Coatings formulated for and applied to public streets, highways, and other surfaces including, but not limited to curbs, berms, driveways, and parking lots.

(34) Undercoaters: Coatings formulated and applied to substrates to provide a smooth surface for subsequent coats.

(35) Varnishes: Clear wood finishes formulated with various resins to dry by chemical reaction on exposure to air.

(36) Volatile Organic Compounds (VOC): Compounds of carbon which may be emitted to the atmosphere during the application of and or subsequent drying or curing of coatings subject to this rule, except methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, ammonium carbonate, 1,1,1-trichloroethane, methylene chloride, trichlorofluoromethane (CF C-11), dichlorodifluoromethane (CFC-12), chlorodifluoromethane (CFC-22), trifluoromethane (CFC-23), trichlorotrifluoroethane (CFC-113), dichlorotetrafluoroethane (CFC-114), and, chloropentafluorethane (CFC-115).

(37) Waterproofing Sealers: Coatings formulated for and applied to porous substrates to prevent the penetration of water.

(c) STANDARDS

(1) Except as provided in Subsections (c)(2), (c)(3), and (c)(4), no person shall, within the District, supply, offer for sale, sell, apply, or solicit the application of any architectural coating which, at the time of sale or manufacture, contains more than 250 grams of volatile organic compounds per liter of coating (less water, and excluding any colorant added to tint bases), or manufacture, blend, or repackage such a coating for use within the District.

(2) Except as provided in Subsections (c)(3) and (c)(4), no person shall, within the District, supply, offer for sale, sell, apply, or solicit the application of any architectural coating listed in the Table of Standards which contains volatile organic compounds (less water, and excluding any colorant added to tint bases) in excess of the corresponding limit specified in the table, after the corresponding date specified, or manufacture, blend, or repackage such a coating for use within the district.

Table of Standards
(grams of VOC per liter)

	Effective Dates			
	9/1/84	9/1/89	9/1/92	9/1/94
Below Ground Wood Preservatives	--	600	350	
Bond Breakers	--	750	350 (9/1/90)	
Clear Wood Finishes				
Lacquer	--	680	550 (9/1/90)	275
Varnish	500	350		
Concrete Curing Compounds	--	350		
Dry Fog Coatings		400		
Fire Retardant Coatings				
Clear	--	650		
Pigmented	--	350		
Form Release Compounds	--	250		
Graphic Arts (Sign) Coatings	--	500		
High Temperature Industrial Maintenance Coatings	--	650	550	420
Industrial Maintenance Coatings	--	420	340	
Magnesite Cement Coatings	--	600	450	
Mastic Texture Coatings	--	300		
Metallic Pigmented Coatings	--	500		
Multi-Color Coatings	--	580	420	
Opaque Stains	400	350		
Opaque Wood Preservatives	400	350		
Pre-treatment Wash Primers	--	780	780	420
Primers Sealers & Undercoaters	400	350		
Roof Coatings	--	300		
Semi-transparent Stains	--	350		
Semi-transparent and Clear Wood Preservatives	--	350		
Shellac				
Clear	--	730		
Pigmented	--	550		
Swimming Pool Coatings	--	650	340 (9/1/92)	
Repair and Maintenance Coatings	--	650	340 (9/1/97)	
Traffic Paints				
Public streets & highways	415	250		
Other surfaces	250	250		
Black traffic coatings	--	250		
Waterproofing Sealers	--	400		

(3) If anywhere on the container of any coating listed on the Table of Standards, on any sticker or label affixed thereto, or in any sales or advertising literature, any representation is made that the coating may be used as, or is suitable for use as a coating for which a lower VOC standard is specified in the table or in Subsection (c)(1), then the lowest VOC standard shall apply. This requirement does not apply to the representation of the following coatings in the manner specified:

(i) High Temperature Industrial Maintenance Coatings, which may be represented as metallic pigmented coatings for use consistent with the definition of high temperature industrial maintenance coatings;
(ii) Lacquer Sanding Sealers, which may be recommended for use as sanding sealers in conjunction with clear lacquer topcoats;
(iii) Metallic Pigmented Coatings, which may be recommended for use as primers, sealers, undercoaters, roof coatings, or industrial maintenance coatings; and
(iv) Shellacs.

(4) Sale of a coating manufactured prior to the effective date of the corresponding standard in the Table of Standards, and not complying with that standard, shall not constitute a violation of Subsection (c)(2) until two years after the effective date of the standard, nor shall application of such a coating.

(5) Where coatings applied to uninstalled architectural appurtenances not requiring on-site modification may be subject to more than one coating rule of the district, the rule with the lowest VOC standard shall apply.

(6) All VOC-containing materials shall be stored in closed containers when not in use. In use includes, but is not limited to: being accessed, filled, emptied, maintained or repaired.

(d) ADMINISTRATIVE REQUIREMENTS

(1) Each container of any coating subject to this rule shall display the date on which the contents were manufactured or a code indicating the date of manufacture. Each manufacturer of such coatings shall file with the Air Pollution Control Officer and the Executive Officer of the California Air Resources board, an explanation of each code.

(2) Each container of any coating subject to this rule shall display a statement of the manufacturer's recommendation regarding thinning of the coating. This recommendation shall not apply to the thinning of architectural coatings with water. The recommendation shall specify that the coating is to be employed without thinning or diluting under normal environmental and application conditions unless any thinning recommended on the label for normal environmental and application conditions does not cause a coating to exceed its applicable standard.

(3) Each container of any coating subject to this rule and manufactured after (one year from the date of adoption) shall display the maximum VOC content of the coating, as applied, and after any thinning as recommended by the manufacturer. VOC content shall be calculated in accordance with Section (f)(1).

(4) Beginning (one year from the date of adoption), the labels of all industrial maintenance coatings shall include the statement "Not for Residential Use", or "Not for Residential Use in California", prominently displayed.

(e) EXEMPTIONS

The requirements of this rule do not apply to:

(1) Architectural coatings manufactured for use outside of the District or for shipment to other manufacturers for repackaging.

(2) Architectural coatings supplied in and applied from containers having capacities of one liter or less, which were offered in such capacities prior to (the date of adoption of this rule).

(3) Architectural coatings sold in non-refillable aerosol containers having capacities of one liter or less.

(4) Emulsion-type bituminous pavement sealers.

(f) TEST METHODS

(1) Volatile Organic Compounds: Measurement of volatile organic compounds in architectural coatings shall be conducted and reported in accordance with EPA Test Method 24 (40 CFR 60, Appendix A), or an equivalent method approved by the air pollution control officer.