VIII.

ECONOMIC IMPACTS

A. INTRODUCTION

Elements of the Analysis

This chapter discusses the economic impacts we anticipate from implementation of the proposed limits. In general, economic impact analyses are inherently imprecise by nature, especially given the unpredictable behavior of companies in a highly competitive market. While we quantified the economic impacts to the extent feasible, some projections are necessarily qualitative or semi-quantitative and based on general observations about the architectural and industrial maintenance (AIM) coatings industry. This impacts analysis, therefore, serves to provide a general picture of the economic impacts that typical businesses subject to the proposed limits might encounter; we recognize that individual companies may experience impacts different than those projected in this analysis.

The overall projected impacts are summarized first, followed by a more detailed discussion of specific aspects of the economic impacts in the sections listed below:

(B) Annual Costs and the Cost-Effectiveness of the Proposed Limits;
(C) Economic Impacts on California Businesses;
(D) Potential Impacts on California State or Local Agencies;
(E) Potential Impacts on California Consumers; and
(F) Mitigation of Potential Impacts through Additional Regulatory Flexibility.

It is important to note that we conducted the economic impacts analysis despite the fact that the analysis is not required under the California Administrative Procedure Act (APA) for suggested control measures such as the staff's proposal. The analysis uses methodologies and assumptions similar to those used to support adoption of the 1999 SCAQMD Rule 1113 and the 1998 U.S. EPA National AIM Coatings Rule. Moreover, the analysis uses virtually the same methodology adopted by the Board in approving all consumer product rulemakings since 1990 (ARB; 1990; ARB, 1991; ARB, 1997; ARB, 1999). However, this analysis differs somewhat from the analyses used in the SCAQMD and U.S.EPA rulemakings in that additional details regarding the projected costs and cost-effectiveness are presented for each of the categories from which we are projecting non-SCAQMD emission reductions, rather than on an aggregate basis.

The economic impacts analysis was prepared in consultation with ARB's Economic Studies Section (ESS) of the Research Division. The ESS is staffed with professionals who carry out a broad range of assignments for the ARB and other organizations, including the Governor's Office; Cal/EPA boards, offices, and departments (BDOs); and local air pollution control agencies. The section manages extramural research contracts; develops methodologies; collects, analyzes and distributes economic and financial data; conducts economic and financial analyses, including the economic impacts analyses of the Board's regulations; oversees the economic

impact analyses of the regulations promulgated by all Cal/EPA BDOs; and carries out other related tasks as needed by the ARB. The ESS staff hold Ph.D., J.D., M.B.A., M.A., and B.S. degrees in economics, business, chemical engineering, microbiology, and environmental resource science. Members of the ESS have taught economics, accounting, finance, and computer science at the university level; have given invited talks and presented technical papers to major universities, academic associations, and government agencies; and have worked in the private sector in credit analysis, accounting, auditing, production control, environmental consulting, and business law.

Summary of Economic Impacts

Our analysis shows that the cost-effectiveness of the proposed limits is similar to the cost-effectiveness of the SCAQMD's Rule 1113 and the existing consumer product regulations (Phase I-II and the Mid-Term Measures I-II), as well as other existing ARB regulatory programs. We estimate the overall cost-effectiveness of the proposed SCM ranges from $2.70 to $3.90 per pound of VOC reduced, with an average of $3.20 per pound of VOC reduced in current dollars. This cost-effectiveness is comparable in magnitude to those reported for other ARB consumer product regulations and measures, which generally have fallen within a range of no cost to about $6.90 per pound of VOC reduced.

Overall, most manufacturers or marketers of architectural coatings would be able to absorb the cost of the proposed SCM with no significant adverse impacts on their profitability. This finding is indicated by the staff's estimated change in "return on owner's equity" (ROE) analysis. The analysis found that the overall change in ROE ranges from negligible to a decline in ROE of about 2 percent, with an average change in ROE of about 1 percent. A decrease of 10 percent in ROE indicates a potentially significant impact on profitability. Because the proposed SCM would not alter significantly the profitability of most businesses, we do not expect a noticeable change in employment; business creation, elimination or expansion; and business competitiveness in California. We also found no significant adverse fiscal impacts on any local or State agencies.

To project the maximum potential impacts on consumers, we assume the opposite scenario relative to the business impacts analysis. That is, rather than determining whether businesses can absorb all costs incurred and not have a significant impact on their profitability, we assume for the consumer impacts analysis that manufacturers and retailers pass on all the costs to the consumers by raising the price of those coatings that need to be reformulated. With this assumption, we project a maximum producer cost increase ranging from $1.20 to $1.70 per reformulated gallon, with an average of about $1.40 per gallon. Based on an assumed 4X multiplier (i.e., the distributor doubles the purchase price from the manufacturer, and the retailer doubles the purchase price from the distributor), this range translates to a maximum retail price increase of about $4.80 to $6.80 per reformulated gallon, with an average of about $5.60 per gallon. With an average retail price ranging from $18.50 per gallon of noncompliant coating (calculated from "typical noncomplying" formulations with a 4X multiplier) to about $50 per gallon of noncompliant coating (indicated by midpoint of actual street prices from staff's retail shelf survey), the maximum potential increase would equate to a 12% to 30% retail price

increase for reformulated coatings. We anticipate the majority of retail price increases, if any, would occur in the industrial maintenance and other commercial coating applications.

For ordinary consumers, the projected maximum impacts would be less than the impacts shown above. This is because ordinary consumers buy mainly flat and nonflat coatings (such as household wall paint, the majority of consumer purchases). For ordinary household consumers, we project no increase in retail price for a typical reformulated flat paint at $17.00 per gallon and a maximum potential increase of about $3.70 for a typical reformulated nonflat paint at $17.80 per gallon (a 21% increase). It should be noted that consumers who do not wish to purchase these reformulated coatings would still be able to buy the currently available complying coatings at significantly lower prices. The competition from these existing compliant coatings will likely constrain any price increases for the reformulated coatings. In other words, most manufacturers would not be able to pass on all their costs to the consumers as we assumed in this analysis, thereby making the actual retail price increases likely to be less than our projections.

General Approach

While the proposed Table of Standards shows numerous categories, we focused the cost impacts analysis on the eleven coating categories from which we are projecting emission reductions outside of the SCAQMD. As shown later in this section, we also calculated the gallons of noncomplying coatings in each of the 11 categories for the non-SCAQMD areas.

The economic impacts analysis consists of several main parts. First, we calculated the total non-SCAQMD annual costs of the proposal. A sensitivity analysis was conducted to determine the impacts on the annual costs from assumed changes to resin costs, the primary variable influence on raw material costs. The projected annual costs then become the inputs for determining the three main outputs of the analysis: the cost-effectiveness, the business impacts, and the consumer impacts. The cost-effectiveness is presented to compare the proposal's cost-efficiency in reducing a pound of VOC relative to the cost-efficiency of other rules and control measures adopted by the districts and the ARB. The business impacts analysis employs the scenario under which all costs incurred to meet the proposal are absorbed by the manufacturers and marketers. On the other hand, the consumer impacts analysis operates under the hypothetical regime where all costs incurred to meet the proposal are passed on to the consumers in the form of per-gallon price increases. These two parts of the analysis represent the boundaries of expected impacts, with the actual regulatory impacts from the proposal probably falling somewhere between these two extremes (i.e., some costs are absorbed, with the remaining costs passed on to consumers). Thus, the actual business impacts and producer/retail price increases will likely be less than predicted in this analysis.

Sources and Treatment of Cost Data

The cost analysis relies on various sources of information. For cost information specific to manufacturers in each coating category, we relied primarily on industry responses to the December 1999 ARB Economic Impacts Survey. We sent this survey to all entities in the ARB's AIM coatings mailing list, including the 152 companies that sell regulated AIM coatings in California. From this group, we received responses from 25 manufacturers, ultimately using the cost data from 23 respondents (15% sample rate). This survey elicited manufacturers' best estimates of the costs for meeting the proposal, including their estimates of the nonrecurring and recurring costs involved. We also relied on certain cost information and assumptions contained in the rulemaking records for the 1998 U.S. EPA National AIM Coatings Rule and the 1999 SCAQMD Rule 1113 adoptions. These rulemaking records were also used to define the boundary conditions in the sensitivity analysis conducted for this proposal.

The December 1999 ARB Economic Impacts Survey was intentionally open-ended so manufacturers could report all reasonably expected costs they believe they would incur as a result of reformulating products for sale in non-SCAQMD areas in California (ARB, 1999c). However, this does not mean that we accepted all data submitted; per-coating line reformulation cost data from two of the 25 respondents shown in Table VIII-1 were 3 to 10 times those of the other respondents, even for categories where we would expect reformulation costs to be fairly low because of the technologies involved (e.g., flat coatings). Because of this, our analysis did not use the outlier cost data from those two respondents. The outlier data notwithstanding, we have confidence in projecting the remaining cost data submitted to all of the companies with noncompliant coatings because the other 23 responses (15% of the population of affected manufacturers) include a variety of large, medium, and small manufacturers. The survey responses provided a good sampling of products from all 11 categories, covering 558 product lines (8.3% of the total 6,728 estimated noncompliant coating lines) and about 7.3 million gallons (23% of the total statewide noncompliant gallons).

Table VIII-1. 1999 Economic Impact Survey Respondents

1	Alco-NVC, Inc.	14	Lord Corp.
2	Ameron International	15	Masterchem Industries
3	Amteco, Inc.	16	Pacific Polymers, Inc.
4	Deft, Inc.	17	R.J. McGlennon Co., Inc.
5	Dexter Corp.	18	Sherwin-Williams Co.
6	Dow Corning Corp.	19	Symplastics, Inc.
7	Dudick, Inc.	20	Textured Coatings
8	Egyptian Lacquer	21	United Gilsonite Laboratories
9	Hempel Coatings (USA)	22	Valspar Corp.
10	ICI Paints	23	Western Colloid Products dba WCNC Corp.
11	Ingels, Inc.	24	William Zinsser
12	Jones Blair Company	25	Wood-Kote
13	Kelley Technical Coatings		

To determine the cost impacts from changes in raw materials, we relied primarily on spot prices reported in *Chemical Market Reporter* (CMR, 2000) and aggregate ingredient prices reported in the 1997 U.S. Economic Census for Standard Industrial Classification (SIC) 2851 (U.S. Census, 1999). In addition to conservatively using spot prices rather than lower contract prices, we also used the highest shown spot price in those situations when a price range was reported. For other ingredients not shown in these two sources, we used prices reported confidentially by individual coating manufacturers or in literature provided by known coatings experts (e.g., J.A. Gordon, Jr. and R.A. McNeill, *A Condensed Comprehensive Course in Coatings Technology*, 1992). Finally, in those infrequent cases where no price information was available for an ingredient, we applied a default value of $1.50 per pound, which is higher than most of the ingredients used in the raw materials costs analysis, including the resin costs.

B. ANNUAL COSTS AND THE COST-EFFECTIVENESS (C.E.) OF THE PROPOSED LIMITS

Introduction

In the following analysis, we present the anticipated annual costs and cost-effectiveness of the proposed new limits. Determining the proposal's cost-effectiveness allows us to compare the efficiency of the proposed limits in reducing a pound of VOC relative to other existing regulatory programs. To do this, we applied a well-established methodology for converting compliance costs, both nonrecurring and recurring costs, to an annual basis. We then report the ratio of the annual costs to the annual emission reductions in terms of "dollars (to be) spent per pound of VOC reduced." To put the proposal's cost-effectiveness into proper perspective, we compare the results of our analysis with the cost-effectiveness of other ARB regulations and control measures.

Methodology

As noted previously, the cost-effectiveness of a limit is generally defined as the ratio of total dollars to be spent to comply with the limit (as an annual cost) to the mass reduction of the pollutant(s) to be achieved by complying with that limit (in annual pounds). Annual costs include annualized nonrecurring costs (e.g., total research and development (R&D), product and consumer testing, equipment purchases/modifications, one-time distributional/marketing changes, etc.) and annual recurring costs (e.g., increases or decreases in raw material costs, labeling, packaging, recordkeeping & reporting, etc.). Thus, the cost-effectiveness is calculated according to the following general equations:

$$Cost\text{-}Effectiveness = \frac{Annualized\ Nonrecurring\ Costs + Annual\ Recurring\ Costs}{Annual\ Emission\ Reductions}$$

where,

$$Annualized\ Nonrecurring\ Costs = CRF \times \sum (Nonrecurring\ Costs)$$

$$Cost\ Recovery\ Factor\ (CRF) = \frac{i(i+1)^n}{(i+1)^n - 1}$$

i = discount rate, assumed 10%
n = project horizon, assumed 5 years

$$Annual\ Recurring\ Costs = Non\text{-}Raw\ Material\ Costs + Raw\ Material\ Costs$$

In this analysis, we essentially treated each proposed limit as a separate, stand-alone regulation independent of the other limits. This means we calculate the annual costs and the cost-effectiveness of each limit independent of all the other limits. This approach, approved by the Air Resources Board when it approved the Mid-Term Measures regulation in 1997 (ARB, 1997), represents an expansion and upgrade of previous analyses conducted by the ARB staff in which groups of product categories were evaluated collectively for cost-effectiveness (ARB, 1989; ARB, 1990; ARB, 1991, ARB, 1995). The approach used in this proposal is also significantly different from standardized cost-effectiveness analyses conducted for stationary sources, mobile sources, and other regulated entities. In the typical analysis for those sources, only the cost-effectiveness for the entire regulation is reported, rather than the cost-effectiveness for separate requirements of the regulation (e.g., *see* ARB, 1998). With four sensitivity runs for each of the 11 categories, we ultimately conducted 44 individual cost-effectiveness analyses for this report.

We believe treating each proposed limit as a separate regulation is appropriate for several reasons. First, this approach prevents very cost-effective limits (e.g., those with large emission reductions coupled with low costs) from "masking" relatively cost-ineffective limits. Such cost-ineffective limits can then be evaluated for possible elimination or substitution by other proposed limits that are more cost-effective. Another reason for treating each limit independent of the others is that each limit is, in reality, generally independent of all the other limits. For example, the limit for swimming pool coatings probably has little or no relationship with the limit for flat coatings. For these reasons, our approach for treating each limit separately for cost-effectiveness calculations provides a more conservative and realistic analysis.

As shown earlier, we annualized the nonrecurring costs (i.e., one-time fixed costs such as R&D, equipment purchases, etc.) using the Capital Recovery Method, which is the recommended approach under California Environmental Protection Agency (Cal/EPA) guidelines. Using this method, we multiply the estimated total fixed costs to comply with each proposed limit by the Capital Recovery Factor (CRF) to convert these future costs into discounted, equal annual payments in current dollars over the selected project horizon (i.e., the projected useful life of the investment) (Cal/EPA, 1996). We then sum the annualized fixed costs with the annual recurring costs (subtracting out any cost savings due to changes in raw material costs) and divide that sum by the annual emission reductions to calculate the cost-effectiveness of each limit.

Assumptions

There are four key assumptions we used in calculating total annual costs, two of which are based on the rulemaking documentation used to support the 1998 U.S. EPA National AIM Coatings Rule, while a third assumption is based on the rulemaking documentation for the 1999 SCAQMD amendment of Rule 1113 and comments received from industry representatives.

The first and most important assumption is that manufacturers will need to incur reformulation costs to meet the proposed SCM limits for all their product lines. That is, we assumed that manufacturers will have to "start from scratch" when determining how to comply with the proposed limits. In reality, however, this is unlikely to be the case because the proposed limits mirror all of the existing 2002 limits in Rule 1113 (except for swimming pool repair). Thus, the vast majority of manufacturers are already conducting R&D and taking other steps necessary to meet the SCAQMD limits; for those manufacturers, compliance in air districts that choose to adopt the staff's proposal should require few, if any, additional steps and capital expenditures. Because of this assumption, we believe its is highly likely that we substantially overestimated the costs for the proposed SCM.

The second assumption we used is the U.S. EPA's assumption that, for a typical company, about one-third of its product lines are sufficiently similar enough to each other that no additional reformulation of that one-third is required to meet the limit (U.S. EPA, 1998, at 2-312). That is, once the manufacturer reformulates one of the products in the one-third group, it can transfer that technology to the remaining products in the one-third group. The remaining two-thirds of the typical company's product lines are then assumed to require a separate and independent reformulation for each line within that group. A review of the ARB's 1998 Architectural Coatings Database confirms this assumption for many companies, leading us to conclude that the assumption is valid.

The third main assumption is that the actual costs to reformulate are likely to be 1/3 to 1/5 that of the reported costs (*Id.*, at 2-307). In its rulemaking docket, the U.S. EPA stated that it started with a reformulation cost of $250,000 per coating line, which it ultimately downgraded to $87,000 per coating line based on comments received from industry. However, the U.S. EPA then stated its belief that even the $87,000 per coating line figure was probably higher than the true costs to reformulate by a factor of 3 to 5. When it used $80,000 per reformulation in its recent Rule 1113 amendment, the SCAQMD also indicated that its estimate was probably higher than true costs. This was because the $80,000 figure was reported for a coating category that was expected to be among the most difficult to reformulate. (SCAQMD, 1999b)

Interestingly, our 1999 Economic Impacts Survey appears to confirm both statements. From our survey, we calculate an average, per-coating line reformulation cost of about $25,000 to meet the staff's proposal, which is about 3.2 to 3.5 times lower than the figures reported by the SCAQMD and the U.S. EPA, respectively. An alternative explanation for the $25,000 average reformulation cost from our survey is that the survey respondents have to reformulate to meet the SCAQMD Rule 1113 limits anyway and were simply reporting additional costs to market and distribute those products throughout the rest of California. For those manufacturers that already

distribute products outside the SCAQMD, the additional costs to market and distribute products for the rest of the State that were reformulated to meet the SCAQMD rule may not be significant. Thus, the 1999 Economic Impacts Survey and the fact that most manufacturers already have to reformulate to meet the SCAQMD limits provide a good foundation for applying a 1/3 multiplier against the reported reformulation costs.

The fourth main assumption is that the resin costs for complying coatings will increase by a certain level. Resin costs are the primary influence on raw materials cost for most coatings and, because there are a variety of resins with differing costs, resins have the most variable impact on raw materials cost. The resin portion of a coating typically represents about 20% to 50% or more of the total raw materials cost of a gallon of coating (*see* Appendix F).

Technically, our analysis does not require an assumption of increased prices for the resin. This is because the typical complying formulations shown in Appendix F reflect existing technologies, as discussed in Chapter IV of this report and in the attached Environmental Impacts Report. Because the technologies already exist to comply with the limits (ARB, 2000), estimating the cost impacts from raw material changes only requires using the current prices for ingredients in typical noncomplying and complying coatings and then determining the difference in overall per-gallon costs for the complete coating. Resin prices may rise in the short run, due to a lack of production capacity sufficient to meet the demand. However, prices will come down when production capacity is expanded to meet the increased demand.

Despite our belief that an assumption of increased resin price is not needed for our analysis, we nevertheless decided to perform a sensitivity analysis using various assumed increases in the resin costs for the complying coatings to account for the possibility that manufacturers will use re-engineered, higher-cost resins in their reformulated coatings, at least in the short term. With current ingredient prices as the baseline scenario, we conducted complete cost-effectiveness calculations at 10%, 20%, and 50% assumed increases in compliant resin costs. The 10% and 20% assumed resin price increases are consistent with the socioeconomic impacts analysis conducted by the SCAQMD and confidential comments provided by some manufacturers. To be conservative, we use the 20% resin price increase assumption wherever we refer to the "average" cost-effectiveness of each limit and the overall cost-effectiveness. The 50% assumed resin price increase is intended as an extreme upper boundary for purposes of the sensitivity analysis and is not suggested by any information available to staff as reflective of projected actual resin prices when the proposed limits become effective.

Additional secondary assumptions we made include assuming a project horizon of 5 years and a discount rate of 10% throughout the project horizon. The 5-year project horizon is appropriate because that is the generally-accepted project horizon used in cost analyses involving chemical processing industries. In addition, 5 years is the number of years for a project horizon generally recommended by Cal/EPA when conducting a cost-effectiveness analysis (Cal/EPA, 1996, *supra*). With regard to the discount rate, Cal/EPA recommends 2% plus the current yield for a U.S. Treasury Note of similar maturity to the project horizon (*Id.*), which in recent years has been about 8% altogether. To be conservative, we use 10% as the discount rate, which inflates annual costs relative to an 8% discount rate.

Results

Tables VIII-2 through VIII-5 show calculational inputs, results from the 1999 Economic Impacts Survey, estimated annual regulatory costs, and the cost-effectiveness of the proposed limits on both an individual limit and overall basis (using the 20% resin price increase assumption). Table VIII-6 compares the estimated cost-effectiveness for the staff's proposal with the cost-effectiveness of the 2002 (interim) limits in the SCAQMD Rule 1113 and with other VOC-reduction measures recently adopted by the Board. As shown in Table VIII-6, the average $3.20 per pound VOC reduced overall cost-effectiveness of the proposed limits compares favorably with the cost-effectiveness of similar regulations. Moreover, the cost-effectiveness of the individual proposed limits ($0 to $7.65 per pound of VOC reduced) is consistent with the individual cost effectiveness of the SCAQMD Rule 1113 interim limits ($0.50 to $5.60 per pound of VOC reduced) and the individual consumer product limits ($0 to $7.10 per pound of VOC reduced). Thus, even with the assumption that resin prices will increase by 20%, the proposed limits are clearly cost-effective.

Table VIII-2. Various Inputs for Cost Calculations

Coating Category	Proposed Limit g/L	Emission Reductions Tons/Day	Estimated # Products Non-compliant	Estimated # Gallons per Year Non-compliant	Product Lines To be Reformulated Based on USEPA's 2:3 Ratio [FNa]
		(A)	(B)	(C)	(D) = (B) x (2/ 3)
Flats	100	1.39	1,258	8,728,589	839
Industrial Maintenance	250	2.95	1,818	1,530,729	1,212
Lacquer	550	1.03	212	299,631	141
Multicolor	250	0.01	9	7,553	6
Non-flat (low & medium-gloss)	150	1.17	1,713	4,014,795	1,142
Primers, Sealers, Undercoaters (PSU)	200	0.64	361	747,561	241
Quick Dry Enamel	250	0.99	154	476,559	103
QuickDryPSU	200	1.00	131	526,095	87
Stains	250	0.64	986	587,390	657
Swimming Pool Repair	340	0.03	6	6,861	4
WaterProofing Sealers	250	0.39	80	355,495	53
	SUM	10.24	6,728	17,281,258	4485

FNa: Assumes that, for a typical company, a third of its product lines are similar enough to each other to not require Reformulation, while the remaining 2/3 would require new formulations.
U.S. EPA, August 1998 (citing data from AIM industry received during the reg-neg process).

Table VIII-3. Nonrecurring Costs from 1999 ARB Economic Impact Survey

Coating Category	ARB Survey-Reported Nonrecurring Cost to Reformulate Dollars per Product Line	ARB Survey-Reported Nonrecurring Cost to Reformulate Dollars
	(E)	(F) = (E) x (D)
Flats	$4,821	$4,042,803
Industrial Maintenance	$39,541	$47,923,808
Lacquer	$47,306	$6,685,950
Multicolor	$25,098	$150,586
Non-flat (low & medium-gloss)	$27,661	$31,589,025
Primers, Sealers, Undercoaters (PSU)	$128,618	$30,953,980
Quick Dry Enamel	$359,000	$36,857,333
QuickDryPSU	$36,733	$3,208,044
Stains	$11,916	$7,832,926
Swimming Pool Repair	$14,333	$57,333
WaterProofing Sealers	$36,429	$1,942,857

Source: December 1999 ARB Economic Impacts Survey

Table VIII-4. Calculated Annual Costs

Coating Category	Annualized Nonrecurring Cost [FNb] Dollars per Year	Annual Recurring Costs (Non-Raw Material) [FNd] Dollars per Year	Annual Recurring Costs (Raw-Materials) [FNf] (from Appendix F) Dollars per Year	Total Annual Costs Dollars per Year
	(G) = (F) x CRF / 3 [FNc]	(H) = (RC/Line)x(D)/3 [FNc, FNe]	(I) = ($/gal) x (C)	(J) = (G) + (H) + (I)
Flats	$355,494	$63,898	($726,219)	($306,826)
Industrial Maintenance	$4,214,060	$9,945,927	($2,132,306)	$12,027,681
Lacquer	$587,912	$715,500	($104,421)	$1,198,991
Multicolor	$13,241	$0	$7,436	$20,677
Non-flat (low & medium-gloss)	$2,777,702	$856,858	$99,567	$3,734,127
Primers, Sealers, Undercoaters (PSU)	$2,721,861	$2,951,201	($2,100,049)	$3,573,013
Quick Dry Enamel	$3,240,957	$62,741	($433,478)	$2,870,220
QuickDryPSU	$282,091	$12,809	($476,747)	($181,847)
Stains	$688,769	$1,466,528	($1,154,809)	$1,000,488
Swimming Pool Repair	$5,041	$644	$12,504	$18,190
WaterProofing Sealers	$170,840	$257,406	($570,215)	($141,969)
SUM	$15,057,969	$16,333,512	($7,578,737)	$23,812,744
Discount Rate (i), %	10.00%		Grand Total Annual Costs ($/Yr)	$23,812,744
Project Horizon (n), yrs	5			
Cost Recovery Factor (CRF)	0.26380			

Table VIII-5. Calculated Cost-Effectiveness and Maximum Per-Gallon Cost Increases

Coating Category	Individual Cost-Effectiveness for Each Limit Dollars per Pound VOC Reduced	Cost Increase Per Gallon [FNg] Dollars per Gallon
	(J) / [(A) x 365 x 2000]	(J) / (C)
Flats	($0.30)	($0.04)
Industrial Maintenance	$5.59	$7.86
Lacquer	$1.59	$4.00
Multicolor	$2.83	$2.74
Non-flat (low & medium-gloss)	$4.37	$0.93
Primers, Sealers, Undercoaters (PSU)	$7.65	$4.78
Quick Dry Enamel	$3.97	$6.02
QuickDryPSU	($0.25)	($0.35)
Stains	$2.14	$1.70
Swimming Pool Repair	$0.83	$2.65
WaterProofing Sealers	($0.50)	($0.40)

	Cost-Effectiveness (C.E.) [FNh]	**Cost Increase [FNi, FNj]**	
OVERALL RESULTS	$3.19 Per Lb VOC Reduced	$1.38 Per Gallon	29.9% Change from Base

Table VIII-6. Cost-Effectiveness of Proposed Limits vs. Similar Control Programs

Regulation or Control Measure	Overall Cost-Effectiveness (Dollars per Pound VOC Reduced)	Per-Limit Cost-Effectiveness (Dollars per Pound VOC Reduced)
2000 AIM Suggested Control Measure [FNk]	$3.20	net savings to $7.65
SCAQMD Rule 1113 (2002 Limits) [FNl]	$2.45	$0.50 to 5.60
1989 AIM Suggested Control Measure [FNm]	net savings to $6.90	Not Determined
Aerosol Coating Products [FNn]	$2.85 to $3.20	Not Determined
Mid-Term Measures II Cons. Products [FNo]	$0.40	$0.00 to $6.30
Mid-Term Measures I Cons. Products [FNp]	$0.25	$0.00 to $7.10
Phase II Consumer Products [FNq]	<$0.01 to $1.10	Not Determined
Phase I Consumer Products [FNr]	net savings to $1.80	Not Determined

Sensitivity Analysis

As noted earlier, we conducted a sensitivity analysis with four different runs, one baseline and three assumed increases in resin prices. Resin price was selected for the sensitivity runs because it is generally considered to be the major variable in raw material costs. As Table VIII-7 shows, even with an extreme assumption of 50% increase in compliant resin price, the overall and individual cost-effectiveness of the proposed limits are still consistent with the cost-effectiveness values projected for Rule 1113 and other ARB regulations shown earlier in Table VIII-6.

Table VIII-7. Cost-Effectiveness of Proposed Limits Under Sensitivity Analysis

Coating Category	Cost-Effectiveness (Dollars per Pound VOC Reduced) for Each Assumed Increase in Compliant Resin Prices			
	Baseline RCM = 1.0	10% Increase RCM = 1.10	20% Increase RCM = 1.20	50% Increase RCM = 1.50
Flats	($1.64)	($0.97)	($0.30)	$1.71
Industrial Maintenance	$5.37	$5.48	$5.59	$5.91
Lacquer	$1.59	$1.59	$1.59	$1.59
Multicolor	$2.55	$2.69	$2.83	$3.26
Non-flat (low & medium-gloss)	$3.13	$3.75	$4.37	$6.23
Primers, Sealers, Undercoaters (PSU)	$7.36	$7.50	$7.65	$8.08
Quick Dry Enamel	$3.77	$3.87	$3.97	$4.28
QuickDryPSU	($0.47)	($0.36)	($0.25)	$0.08
Stains	$2.04	$2.09	$2.14	$2.30
Swimming Pool Repair	$0.48	$0.65	$0.83	$1.36
WaterProofing Sealers	($0.72)	($0.61)	($0.50)	($0.16)
Overall Cost-Effectiveness	$2.72	$2.96	$3.19	$3.88

RCM = Resin Cost Multiplier; multiplied against baseline compliant resin cost to get assumed increased price (see App. F)

Note: "Lacquer" is not affected under sensitivity analysis because no significant modification of nitrocellulose resin is expected.

Footnotes

FNa: Assumes that, for a typical company, a third of its product lines are similar enough to each other to not require Reformulation, while the remaining 2/3 would require new formulations. U.S. EPA, August 1998 (citing data from AIM industry received during the reg-neg process).

FNb: Non-Recurring Costs (NRC) include one-time research and development (R&D), marketing, distributional, Equipment purchase/modifications, etc.

FNc: Based on USEPA's belief that the $87,000 per product line estimate for the national AIM rulemaking is probably 3 to 5 times greater than actual costs. USEPA, 1998.

FNd: Recurring Costs (Non-Raw Material) include packaging, labeling, and other ongoing costs not related to raw material changes. No data reported for Multicolor Coatings.

FNe: Recurring Costs (Non-Raw Material) per Line taken from cost data reported in the ARB's 1999 Economic Impacts Survey.

FNf: Recurring Costs (Raw Material) are the increase/decrease in cost of going from the typical noncomplying to the typical complying formulations shown in Appendix F.

FNg: Producer price increase if total annual costs were passed on by spreading all costs over total annual noncompliant gallons.

FNh: Grand total annual costs divided by total annual emission reductions (7,475,200 lbs VOC reduced/yr).

FNi: Overall "cost increase per gallon" equals total annual costs divided by total non-SCAQMD, noncompliant gallons.

FNj: Overall "cost increase per gallon" expressed as a percentage relative to the baseline noncomplying cost per gallon for each of the 11 categories as shown in App. F.

FNk: Values reported using 20% assumed increase in compliant resin cost

FNl: in 1998 dollars; SCAQMD, 1999, at 5 (App. F, Socio-Economic Impact Assessment)

FNm: in 1998 dollars; ARB, 1989 (1989 AIM Suggested Control Measure)

FNn: in 1998 dollars; ARB, 1995 (Aerosol Coating Regulation)

FNo: in 1998 dollars; ARB, 1999 (Mid-Term Measures II Regulation)

FNp: in 1998 dollars; ARB, 1997 (Mid-Term Measures I Regulation)

FNq: in 1998 dollars; ARB, 1991 (Consumer Products Phase II Regulation)

FNr: in 1998 dollars; ARB, 1990 (Consumer Products Phase I Regulation)

Cost Recovery Factor (CRF) = $[i\ (1 + i)^n] / [(1 + i)^n - 1]$

Values in "( )" are negative (indicates potential cost savings).

C. ECONOMIC IMPACTS ON CALIFORNIA BUSINESSES

Legal Requirements

Technically, an economic impacts assessment is not legally required for the staff's proposal. Section 11346.3 of the Government Code requires State agencies to assess the potential for adverse economic impacts on California business enterprises and individuals when proposing to adopt or amend any administrative regulation. The assessment shall include a consideration of the impact of the proposed regulation on California jobs, business expansion, elimination or creation, and the ability of California business to compete with businesses in other states. Because the staff's proposal is a Suggested Control Measure (SCM) rather than an administrative regulation, the business impacts assessment is not required. However, we have decided to conduct the normally-required business impacts assessment to provide the Board and local air districts a comprehensive evaluation of the potential cost impacts.

Similarly, we also evaluated the SCM's potential impacts to State and local agencies. Normally, State agencies are required to estimate the cost or savings to any State or local agency and school district in accordance with instructions adopted by the Department of Finance. The estimate shall include any nondiscretionary cost or savings to local agencies and the cost or savings in federal funding to the State.

Moreover, we evaluated the costs of alternatives for the SCM. Had the proposal been a regulation, Health and Safety Code section 57005 would have required the ARB to perform an economic impact analysis of submitted alternatives to a proposed regulation before adopting any major regulation. A major regulation is defined as a regulation that will have a potential cost to California business enterprises in an amount exceeding ten million dollars in any single year.

Potential Impact on California Businesses

The staff's analysis shows that most affected businesses would be able to absorb the costs of the proposed SCM with no significant adverse impacts on their profitability. However, the proposed SCM may impose economic hardship on some businesses with small or no margin of profitability. These businesses, if hard pressed, can seek relief under the variance provision of the local air districts for extensions to their compliance dates. Such extensions may provide sufficient time to minimize the cost impacts to these businesses. Also, the averaging plan under development will provide flexibility by allowing emissions averaging between coating lines, which may help these businesses mitigate their costs. Because the proposed amendments would not alter significantly the profitability of most businesses, we do not expect a noticeable change in employment; business creation, elimination or expansion; and business competitiveness in California.

Discussion

This portion of the economic impact analysis is based on a comparison of the return on owners' equity (ROE) for affected businesses before and after inclusion of the cost to comply

with the proposed requirements. The data used in this analysis are obtained from publicly available sources, the 1998 ARB Architectural Coatings Survey (Survey), and the staff's cost-effectiveness analysis discussed earlier in this chapter.

Affected Businesses

Any business that manufactures or markets architectural and industrial maintenance (AIM) coatings would potentially be affected by the proposed SCM. Also potentially affected are businesses that supply resins, exempt solvents, other ingredients and equipment to these manufacturers or marketers, or distribute, sell or use AIM coatings. The focus of this analysis, however, will be on manufacturers or marketers because these businesses would be directly affected by the proposed SCM.

AIM coatings are manufactured or marketed by 152 companies nationwide, of which 52 are based in California, according to the 1998 ARB Survey. These companies generated about $7 billion in national sales in 1997, of which an estimated $870 million was in California (NPCA, 1999a-c). The bulk of this sales volume was generated by a few companies; ten manufacturers account for 75% of the volume, with the remaining 142 companies accounting for the other 25% (ARB, 1999b).

The architectural coatings companies marketed an estimated total of about 48.2 million gallons of paints and coatings in California outside the SCAQMD in 1996, of which 30.9 million gallons was compliant and 17.3 million gallons was noncompliant (*Id.*). California based companies accounted for 66 percent of compliant gallons and 58 percent of noncompliant gallons of paints and coatings marketed in California as shown in Table VIII-8 (*Id.*).

Table VIII-8. Gallons of Compliant and Noncompliant AIM Coatings Marketed in California outside the South Coast Air Quality Management District

Product Type	**California Firms**		**Non-California Firms**		**Total**	
Compliant Gallons	20,377,806	66%	10,497,658	34%	30,875,464	100%
Noncompliant Gallons	10,023,130	58%	7,258,128	42%	17,281,258	100%
Total	30,400,936 gallons		17,755,786 gallons		135 firms (selling outside SCAQMD)	
Firms	52		100		152 (firms selling in all of CA)	

All affected categories of paints and coatings are classified under Standard Industrial Classification (SIC) 2851 or new North American Industry Classification System (NAICS) 325510. A list of these categories is provided in Table VIII-9. The product category with the most percentage of noncompliant gallons is quick dry enamel; followed by waterproofing sealers, lacquer, industrial maintenance, quick dry PSU, swimming pool repair, flats, stains, nonflats, multicolor, and PSU.

Table VIII-9. Affected Coating Categories and Estimated Non-SCAQMD Gallons

Category	Non-SCAQMD Gallons		% of Total
	Compliant	Noncompliant	Noncompliant
Flats	8,057,159	8,728,589	52
Industrial Maintenance	595,284	1,530,729	72
Lacquer	48,777	299,631	86
Multicolor	14,623	7,533	34
Non-flat (low & medium-gloss)	6,836,002	4,014,795	37
Primers, Sealers, Undercoaters (PSU)	2,127,674	747,561	26
Quick Dry Enamel	145	476,559	100
Quick Dry PSU	283,282	526,095	65
Stains	662,376	587,390	47
Swimming Pool Repair	5,176	6,861	57
WaterProofing Sealers	53,120	355,495	87

Study Approach

Of the 152 manufacturers or marketers of AIM coatings included in the ARB's 1998 Survey, a total of 135 companies manufactured or marketed noncompliant paints and coatings in California outside SCAQMD in 1996. This study covers these affected businesses. The approach used in evaluating the potential economic impact of the proposed SCM on these businesses is outlined as follows:

(1) A sample of three representative businesses of different sizes was selected from the list of 135 affected businesses based on the size of their sales and quantity of noncompliant paints and coatings they manufactured or marketed.
(2) Compliance cost was estimated for each of these businesses.
(3) Estimated cost was adjusted for federal and State taxes.
(4) The three-year average ROE was calculated, where data were available, for each of these businesses by averaging their ROEs for 1997 through 1999 (Dun and Bradstreet, 2000). ROE is calculated by dividing the net profit by the net worth. The adjusted cost was then subtracted from net profit data. The results were used

to calculate an adjusted three-year average ROE. The adjusted ROE was then compared with the ROE before the subtraction of the adjusted cost to determine the potential impact on the profitability of the businesses. A reduction of more than 10 percent in profitability is considered to indicate a potential for significant adverse economic impacts.

The threshold value of 10 percent has been used consistently by the ARB staff to determine impact severity (ARB, 1990; ARB, 1991; ARB, 1995; ARB, 1998). This threshold is consistent with the thresholds used by the United States Environmental Protection Agency and others.

Assumptions

The ROEs before and after the subtraction of the adjusted compliance costs were calculated for each size business using financial data for 1997 through 1999. The calculations were based on the following assumptions:

(1) Selected businesses are representative of affected businesses;
(2) All affected businesses were subject to the highest federal and State corporate tax rates of 35 percent and 8.835 percent respectively; and
(3) Affected businesses are not able to increase the prices of their products, nor can they lower their costs of doing business through short-term cost-cutting measures.

Given the limitation of available data, staff believes these assumptions are reasonable for most businesses at least in the short run; however, they may not be applicable to all businesses.

Results

Typical California businesses are affected by the proposed SCM to the extent that the additional costs imposed by the proposed requirements would change their profitability. A detailed discussion and analysis of these costs is provided in the cost-effectiveness section of this report. According to the staff's cost analysis, the costs of reformulating a gallon of noncompliant architectural coating will range from about $1.30 to $1.70, with a weighted average of about $1.40.

Using ROE to measure profitability, we found that the average ROE of sample businesses in the AIM coatings industry declined by about 1.1 percent as shown in Table VIII-10. This represents a minor change in the average profitability of sample businesses.

Table VIII-10. Changes in Return on Owner's Equity (ROEs) for Typical Businesses in Architectural & Industrial Maintenance Coatings Industry

Size	ΔROE
Small	1.69%
Medium	1.49%
Large	0.06%
Average	**1.08%**

Note: "Δ" means change or difference; all ΔROEs shown are negative (i.e., shows a decline in profitability)

As shown in Table VIII-10, the projected change in profitability of typical businesses in the AIM coatings industry varied widely. The predicted decline in profitability of sample businesses ranged from a high of about 1.69 percent for a small business to a low of 0.06 percent for a large business. This variation in the impact of the proposed SCM can be attributed mainly to the following factors. First, large businesses incur higher costs due to the quantity of noncompliant paints and coatings they manufacture or market. For instance, the estimated annualized costs for affected businesses ranged from a high of about $288,000 to a low of about $3,842. Second, small businesses are usually dependent more financially on affected products than large businesses. Finally, the performance of businesses may differ from year to year. Hence, the average 1997 through 1999 financial data used may not be representative of an average-year performance for some businesses.

The estimated changes to ROEs may be high for the following reasons. First, annualized costs of compliance are estimated using, in part, the current prices of raw materials. Raw material prices usually tend to fall as higher demand for these materials induces economy of scale production in the long run. Second, affected businesses probably would not absorb all of the increase in their costs of doing business. They might be able to either pass some of the cost on to consumers in the form of higher prices, reduce their costs, or do both.

Potential Impact on Suppliers

Companies which supply resins, solvents, other chemicals and equipment for use in reformulating AIM coatings would potentially benefit from the proposed SCM as they experience an increase in demand for their products. On the other hand, those companies that supply raw materials for existing noncompliant paints and coatings may experience a decline in demand for their products.

Distributors and retailers may be adversely impacted if the increased costs of coatings dampen demand for architectural coatings. They may also be burdened by the task of ensuring

that noncompliant products are not sold past the allowable "sell-through period." However, given the over three-year lead time before the proposed limits become effective and the proposed three-year sell through period, distributors and retailers should have ample time to make the appropriate adjustments in their operations to minimize any such impacts.

Potential Impact on Employment

The proposed SCM is not expected to cause a noticeable change in California employment and payroll. According to the 1997 Economic Census, California employment in the paint and allied products industry (NAICS 325510/SIC 2851, which includes establishments engaged in manufacturing paints, varnishes, lacquers, enamels and shellac, putties, wood fillers and sealers, paint and varnish removers, paint brush cleaners and allied paint products) was 4,651 in 1997, or about 9 percent of the national employment in the industry. This also represents only about 0.2 percent of the total manufacturing jobs in California. These employees working in 180 establishments generated about $180 million in payroll, accounting for less than 0.3 percent of total California manufacturing payroll in 1997. Sixty establishments had 20 employees or more; the rest had less than 20 employees each.

The employment in the paint and coating industry is unlikely to change significantly as a result of the proposed SCM. This is because the proposed SCM, if adopted by the districts, applies only to about 55 percent of the California market for AIM coatings. Thus, its impact will be even smaller than indicated above. In addition, as shown above, affected manufacturers or marketers would be able to absorb the reformulation costs with no significant impact on their profitability.

Potential Impact on Business Creation, Elimination or Expansion

The proposed SCM should have no noticeable impact on the status of California businesses. This is because the reformulation costs are not expected to impose a significant impact on the profitability of businesses in California. However, some small businesses with little or no margin of profitability may lack the financial resources to reformulate their products in a timely manner. Should the proposed measures impose significant hardship on these businesses, temporary relief in the form of a compliance date extension under the local districts' variance provision may be warranted.

While some individual businesses may be affected adversely, the proposed SCM may provide business opportunities for existing California businesses or result in the creation of new businesses. California businesses that supply raw materials and equipment or provide consulting services to affected industries may benefit from increased industry spending on reformulation.

Potential Impact on Business Competitiveness

The proposed SCM should have no significant impact on the ability of California businesses to compete with businesses in other states. Because the proposed measures would apply to all businesses that manufacture or market architectural coatings for sale in California

regardless of their location, the staff's proposal should not present any economic disadvantages specific to California businesses. Of a total of 152 companies involved in manufacturing or marketing architectural coatings, 52 are located in California. These companies manufactured or marketed only 10 out of 110 noncompliant coating lines.

The competitiveness of small businesses is not likely to be adversely affected by the fact that larger manufacturers can lower their costs through averaging or because of their economies of scale. This is because smaller businesses in this industry tend to cater to niche markets that are based on competitive factors other than price, thereby making such businesses less sensitive to prices set by larger manufacturers. As noted earlier, 75% of the total sales volume of coatings in California is sold by only 10 manufacturers, while the other 142 manufacturers sell 25% of the remaining sales volume. Thus, a small portion of the market is comprised of many small and medium businesses, which sell coatings on the basis of coating specialization, brand loyalty, customer service, warranties, and other non-price related factors. A more detailed discussion of how niche-based small manufacturers generally do not compete with larger manufacturers is provided in the staff report for the Alternative Control Program for Consumer Products (ARB, 1994).

Nonetheless, the proposed measures may have an adverse impact on the competitive position of some small, marginal businesses in California if these businesses lack resources to develop commercially acceptable products in a timely manner. As stated above, such impacts can be mitigated to a degree with a justifiable compliance extension under the local districts' variance provision, or through additional regulatory flexibility afforded by the averaging program currently under development.

D. POTENTIAL IMPACTS ON CALIFORNIA STATE OR LOCAL AGENCIES

We have identified no State or local agency that would be adversely affected by the proposed new limits. The California Prison Authority (PIA), which manufactures or markets some products for use in State service, is the only agency we are aware of that makes consumer products and goods. However, the PIA manufactures none of the AIM coatings that are subject to the proposed new limits (PIA, 2000). In addition, those State or local agencies that use AIM coatings in their ordinary course of business will have the same variety of coatings available to purchase as any other industrial, commercial, or household consumer in California. Thus, the proposed SCM should have no adverse impacts on State or local agencies.

E. POTENTIAL IMPACTS ON CALIFORNIA CONSUMERS

The potential impact of the proposed SCM on consumers depends on whether it would change the price or performance attributes of noncompliant products that are reformulated to meet the limits. Currently, there are no noticeable differences between the market prices for compliant and noncompliant products. Within the same coating categories, compliant and noncompliant coatings are basically interchangeable. Given the availability of good substitute products, it is unlikely that affected businesses will be able to pass on the cost increases to consumers at least in the short run. In the long run, however, if businesses are unable to bring

down their costs of doing business, they would pass their cost increases on to consumers. In such a case, we estimate an maximum potential increase of about $5.60 per gallon. As Table VIII-11 shows, the retail price of affected AIM coatings varies widely, ranging from around $3 per gallon to $100 per gallon or more. Thus, a $5.60 per gallon maximum potential increase would represent about 12 percent in product price increases relative to the retail midpoint price of about $50 across all the affected categories.

Table VIII-11. Typical Retail Prices of Affected AIM Coatings

Category	Price Range (current dollars per gallon)
Flats	$3 to $30
Industrial Maintenance	$34 to $100+
Lacquer	$18 to $25
Multicolor	$36 to $91
Nonflats (low & medium gloss)	$3 to $35
Primers, Sealers, Undercoaters (PSU)	$9 to $31
Quick Dry Enamel	$25 to $35
Quick Dry PSU	$3 to $25
Stains	$4 to $36
Swimming Pool Repair	$35 to $85
Waterproofing Sealers	$10 to $30

Source: On-site and telephone retail price surveys conducted by ARB staff in Sacramento and various CA locations, Jan.-March 2000.

However, it is important to note that the most individual consumers buy mainly flats and nonflat paints. From the cost-effectiveness analysis presented earlier in this chapter, prices for flats and nonflats are not expected to change noticeably as a result of the proposed SCM. This is because the reformulation of this category does not impose a significant technical challenge to the paint and coating manufacturers. Thus, for most household consumers who purchase coatings such as flat wallpaint, the SCM should have negligible impact on the prices such consumers encounter.

With regard to performance impacts, the proposed SCM limits are unlikely to alter the performance attributes of noncompliant products. This is because there are currently compliant products in the market that have acceptable performance attributes. Indeed, some compliant products represent significant shares in many of their respective categories. Also, staff worked diligently with stakeholders to develop the proposed SCM. As discussed elsewhere in this report, the new proposed limits have been carefully developed to address the industry's concerns regarding the product performance. Thus, consumers should see little or no differences in coating performance relative to currently-available coatings.

F. MITIGATION OF POTENTIAL IMPACTS THROUGH ADDITIONAL REGULATORY FLEXIBILITY

As noted earlier, businesses may be able to mitigate their cost impacts with a justified variance from local district enforcement of the SCM to extend their compliance dates. Manufacturers and marketers may also be able to reduce their costs by implementing an approved averaging plan pursuant to the averaging program currently under development; the general benefits of emissions averaging across product lines are described in more detail elsewhere in the literature (e.g., *see* ARB, 1994a, at VI.8—VI.24). Finally, with over 3 years to reformulate and an additional 3 years of allowable sell-through to eliminate noncompliant inventory, businesses should have ample time to make the necessary plans and adjustments in their operations to minimize the impacts from the SCM.

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