VIII.

ECONOMIC IMPACTS

A. INTRODUCTION

This Chapter discusses the estimated economic impacts we anticipate from implementation of the 26 proposed new VOC limits (there are 15 categories; 26 limits when subcategories, form specific limits, and the prohibition specific to air fresheners are counted) and other proposed changes to the regulations. In general, economic impact analyses are inherently imprecise by nature, given the unpredictable behavior of companies in a highly competitive market such as consumer products. While staff has quantified the economic impacts to the extent feasible, some projections are necessarily qualitative and based on general observations and facts known about the consumer products industry. This impacts analysis, therefore, serves to provide a general picture of the economic impacts typical businesses subject to the proposed limits might encounter; we recognize individual companies may experience different impacts than projected.

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

(B) Economic Impacts Analysis on California Businesses as required by the California Administrative Procedure Act (APA);
(C) Analysis of Potential Impacts to California State or Local Agencies;
(D) Analysis of the Cost-Effectiveness (C.E.) of the Proposed Limits;
(E) Analysis of the Impacts to Raw Materials Cost;
(F) Analysis of the Combined Impacts on Per-Unit Cost from Recurring and Nonrecurring Costs; and
(G) Other Possible Economic Impacts
(H) Mitigation of Potential Impacts through Additional Regulatory Flexibility.

It is important to note that we conducted the economic impacts analysis shown in this report to meet the current legal requirements under the APA. This analysis uses similar methodologies and assumptions as were used in the last two major consumer products rulemakings, the “Mid-Term Measures” regulations adopted by the Board in 1997 and 1999. However, we have updated the methodologies used to determine the high cost estimates for non-recurring costs. Instead of a worst case high cost scenario for each product category, we have determined a more likely high cost scenario specific to each category. See Subsection F of this Chapter for a detailed description of the non-recurring cost determination methodology. The analysis, both here and in the 1997 and 1999 rulemakings, represent a significant update to and expansion of the methodology we used to conduct the cost-effectiveness analyses for the original Phase I-II consumer products rulemakings (ARB, 1990; ARB, 1991).

Summary of Findings

Overall, most affected businesses will be able to absorb the costs of the proposed limits and requirements 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 6.9 percent, with an average change in ROE of about 0.74 percent. However, the proposed measures may impose economic hardship on some businesses with very little or no margin of profitability. These businesses, if hard pressed, can seek relief under the variance provision of the consumer products regulation for extensions to the compliance dates. Such extensions may provide sufficient time to minimize the cost impacts to these businesses. Because the proposed measures would not significantly alter 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 economic impacts to any local or State agencies.

It should be noted than during the regulation development process (See Chapter II), we did not receive significant comment or concerns from affected industry related to cost information, except for proposed VOC limits related to Shaving Gels. There were cost concerns brought up specific to the second-tier Shaving Gel limit, and staff believes that we have addressed those concerns by providing more time to comply with the proposed limit.

Our analysis shows that the cost-effectiveness of the proposed requirements is similar to the cost-effectiveness of other existing ARB regulatory programs. We estimate the total overall cost effectiveness of the initial proposed limits and other requirements to be about $2.00 per pound of VOC reduced. Further when accounting for the proposed second tier Shaving Gel limit, we estimate the overall cost effectiveness to be about $2.40. We acknowledge that compliance with the proposed second tier limit for Shaving Gel is challenging, therefore staff has proposed an effective date of December 31, 2009, and commits to performing a detailed technical and cost assessment of the proposed limit at least one year prior to the effective date. Based on the results of the technical assessment, the proposed second tier for Shaving Gels could be modified if necessary.

We estimate that the total cost incurred by industry to comply with this regulation is about $8 million per year. The second tier Shaving Gel limit would increase the overall cost of the regulation to about $10 million (See Table VIII-2). These cost estimates are based on assumptions specific to each category depending on reformulation needs, and represent the mid-range of the cost estimates. Staff believes the mid-range costs are the most likely to be incurred by industry to comply with the proposed limits. For some categories it was assumed that manufacturers would either drop certain products or undergo minor product formulation changes, and for other categories manufacturers would undergo complete production line overhaul and equipment replacement rather than simple re-tooling.

One way to estimate the potential change in product prices is to determine the change in raw materials cost, which generally has the biggest influence on product cost for most product categories. Our analysis indicates that reformulations to comply with the proposed limits can result in raw material changes ranging from negligible cost (net savings or no cost) up to a cost increase of about $1.34 per unit. The value of $1.34 represents the maximum, worst case per-unit cost increase for a product typically packaged in a gallon container. For those products packaged in smaller containers, the highest, worst case raw material per-unit cost was $0.77 per unit. Again, this range compares favorably to the change in per unit cost projected for the Phase I and II and Mid-Term Measures I and II regulations. The analysis assumed the present cost for raw materials; depending on the formulations chosen by manufacturers and the future price of raw materials, these costs may be lower or higher at the time of the limit effective date. To the extent that the projected cost savings or increases are ultimately passed on to the consumer, the actual retail price of products after the proposed limits become effective may be higher or lower than suggested by this analysis.

Even if all annualized non-recurring costs (research and development, capital equipment purchases, etc.) and recurring raw material cost increases are factored into the affected products manufacturing costs, the potential increase in production per-unit costs are comparable to previous ARB consumer product rulemakings. The estimated per-unit cost increases from both annualized non-recurring and annual recurring costs range from negligible cost (net savings or no cost) to about $2.03 per unit. Again, the value of $2.03 represents the maximum, worst case, per-unit cost increase for a product typically packaged in a gallon container. For those products packaged in smaller containers, the highest, worst case, per-unit cost was $1.07 per unit. When averaged over the total number of unit sales in California of non-complying products, (those that need to reformulate) the unit sales-weighted average cost increase is about $0.16 per unit. As noted before, these per unit cost increases compare favorably to the change in per unit cost projected for previous ARB consumer product rulemakings.

B. ECONOMIC IMPACTS ANALYSIS ON CALIFORNIA BUSINESSES AS REQUIRED BY THE CALIFORNIA ADMINISTRATIVE PROCEDURE ACT (APA)

Legal Requirements

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.

Also, 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.

Findings

Potential Impact on California Businesses - Overall, most affected businesses will be able to absorb the costs of the proposed measures with no significant adverse impacts on their profitability. However, the proposed measures may impose economic hardship on some businesses with very little or no margin of profitability. These businesses, if hard pressed, can seek relief under the variance provision of the consumer products regulation for extensions to their compliance dates. Such extensions may provide sufficient time to minimize the cost impacts to these businesses. Additional mitigation may be achieved by taking advantage of the compliance flexibility offered by the existing IPP and the ACP Regulation (see Subsection H. of this Chapter). Because the proposed measures 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 impacts 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 ARB's 2001 Consumer and Commercial Products Survey (Survey), and the staff's cost-effectiveness analysis discussed later in this Chapter.

Affected Businesses

Any business which manufactures or markets consumer products subject to the proposed new limits and requirements can be directly affected by this regulation. Also potentially affected are businesses which supply raw materials or equipment to manufacturers or marketers, and those that distribute or sell consumer products in California. The focus of this analysis, however, will be on manufacturers, marketers, and distributors that are most affected by the proposed measures.

The consumer products subject to the proposed measures are manufactured, marketed, or distributed by a large number of companies worldwide. According to the 2001 Survey, there are over 160 companies which market the affected products in California. These companies manufacture, market, and distribute a broad range of solvent, adhesive, household, and personal care products, including an estimated total of 1,150 complying and 630 non-complying products (based on reported figures). Of these companies, about 30 firms (mostly medium- or small-sized firms) are located in California.

These 30 California companies fall primarily into 14 North American Industry Classification System codes (NAICS). A list of these industries which we have been able to identify is provided in Table VIII-1. The industries with the most non-complying products are Footwear Manufacturing, Polish and Other Sanitation Goods Manufacturing, Toilet Preparation Manufacturing, All Other Miscellaneous Chemical Product Manufacturing, Motor Vehicle Supplies and New Parts Wholesalers, and Other Chemical and Allied Products Merchant Wholesalers.

Table VIII-1
Industries with Businesses Potentially Affected by the Proposed Limits

NAICS *	Industry	Number of Product Categories*	Number of Non-compliant Products**	Includes:
316213	Footwear Manufacturing	2	60	Footwear or Leather Care Product
325412	Pharmaceutical Preparation Manufacturing	11	15	Specialty Adhesive Remover
325520	Adhesive Manufacturing	5	8	Contact Adhesive
325611	Soap and Other Detergent Manufacturing	6	25	Fabric Refresher
325612	Polish and Other Sanitation Goods Manufacturing	10	65	Toilet/Urinal Care Product
325620	Toilet Preparation Manufacturing	6	145	Hair Styling Product
325998	All Other Miscellaneous Chemical Product Manufacturing	12	80	Electrical Cleaner Gasket or Thread Locking Adhesive Remover
421850	Service Establishment Equipment and Supplies Wholesalers	3	5	Anti-Static Product
423120	Motor Vehicle Supplies and New Parts Wholesalers	7	60	Electronic Cleaner
423610	Electrical Apparatus Equipment, Wiring Supplies Wholesalers	5	20	Floor & Wall Covering Adhesive Remover
423840	Industrial Supplies Merchant Wholesalers	8	12	Wood Cleaner
424690	Other Chemical and Allied Products Merchant Wholesalers	8	60	Graffiti Remover
444110	Home Centers	5	40	General Purpose Adhesive Remover
446110	Pharmacies and Drug Stores	3	35	Shaving Gel

*As reported in the 2001 Consumer and Commercial Products Survey.
** Estimated total; some products may relate to more than one NAICS code.

Study Approach

This study covers 14 industries with at least 160 affected businesses. The approach used in evaluating the potential economic impact of the proposed measures on these businesses is outlined as follows:

(1) A typical business from each affected industry was selected from the Survey respondents.
(2) Compliance cost was estimated for each of these businesses.
(3) Estimated cost was adjusted for federal and state taxes.
(4) The Return on Owner's equity (ROE) was calculated for each of these businesses 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 business. 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, 1997, ARB 1999). This threshold is consistent with the thresholds used by the United States Environmental Protection Agency and others.

Assumptions

This study uses 2002-2003 Dun and Bradstreet financial data for a nationwide typical business in each industry to calculate the ROEs before and after the subtraction of the compliance costs for a typical business in each industry listed in Table VIII-1. The calculations were based on the following assumptions:

(1) A typical business on a nationwide basis in each industry is representative of a typical California business in that industry;
(2) All affected businesses were subject to federal and state tax rates of 35 percent and 9.3 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 new limits to the extent that the implementation of these requirements would change their profitability. Based on our assessment of the proposed limits' cost-effectiveness (see Subsection D. of this Chapter), we estimate the per-business compliance costs to range from about $1,600 (low cost for typical Wood Cleaner, Non-Aerosol Product manufacturer) to about $120,000 per year (high cost for typical Shaving Gel (Tier 2) manufacturer), as shown in Table VIII-2.

INSERT Table VIII-2 here

Using ROE to measure profitability, we found that the average ROE of sample businesses in affected industries declined by about 0.74 percent as shown in Table VIII-3. This represents a minor change in the average profitability of typical businesses in California.

Table VIII-3
Changes in Return on Owner's Equity (ROEs) for Typical Businesses in Affected Industries

NAICS*	Industry	% Change in ROE
316213	Footwear Manufacturing	0.68%
325412	Pharmaceutical Preparation Manufacturing	0.03%
325520	Adhesive Manufacturing	1.38%
325611	Soap and Other Detergent Manufacturing	2.18%
325612	Polish and Other Sanitation Goods Manufacturing	0.07%
325620	Toilet Preparation Manufacturing	0.06%
325998	All Other Miscellaneous Chemical Product Manufacturing	5.02%
421850	Service Establishment Equipment and Supplies Wholesalers	0.16%
423120	Motor Vehicle Supplies and New Parts Wholesalers	0.07%
423610	Electrical Apparatus Equipment, Wiring Supplies Wholesalers	0.01%
423840	Industrial Supplies Merchant Wholesalers	0.02%
424690	Other Chemical and Allied Products Merchant Wholesalers	0.08%
444110	Home Centers	0.57%
446110	Pharmacies and Drug Stores	6.86%
Average		**0.74%**

Note: Changes in ROE mean change or difference; all changes in ROEs shown are negative (i.e., shows a decline in profitability).

As shown in Table VIII-3, the projected change in profitability of typical businesses in the 14 affected industries varied widely. Within the NAICS shown, the predicted change (decline) in profitability of a typical business ranged from a high of about 6.86 percent to a low of 0.01 percent. This variation in the impact of the proposed measures can be attributed mainly to two factors. First, some businesses incur higher costs due to the type of products or the number of noncompliant products they manufacture or market. For instance, the estimated annualized costs for sample businesses ranged from a high of less than $120,000 to a low of about $1,600. Second, the performance of businesses may differ from year to year. Hence, the 2002-2003

financial data used may not be representative of an average-year performance for some businesses.

The estimated potential impacts to businesses' 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.

In past analyses non-recurring costs were allocated to all products in the category, i.e., the costs were spread out over all complying and non-complying products that were reported in the survey. In this analysis, we allocated non-recurring re-formulation costs only to the non-complying products.

Potential Impact on Consumer - The potential impact of the proposed measures on consumers depends upon the ability of affected businesses to pass on the cost increases to consumers. In the short run, competitive market forces may prevent businesses from passing their cost increases on to consumers. Thus, we do not expect a significant change in retail prices 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.

To estimate the price increase, we adjusted per unit compliance costs for each affected industry by its profit margin as provided by Dun and Bradstreet. Assuming affected industries will pass on the entire compliance costs to consumers in terms of higher prices, we estimate the average price of a product would increase by about $0.27 per unit. Product price increases, however, would vary from industry to industry. They would range from a low of about $0.01 per unit of the products sold by service equipment and supplies wholesalers to a high of about $0.98 per unit of the products sold by miscellaneous chemical product manufacturing industry.

The proposed measures may also affect consumers adversely if they result in reduced performance attributes of the products. However, this scenario is unlikely to occur for the following reasons. First, for nearly every proposed limit, there are already complying products that represent significant market share in many of their respective categories. Thus, the industry already has the technology to manufacture compliant products that meet consumer expectation. Second, marketers are unlikely to introduce a product which does not meet their consumers' expectations. This is because such an introduction would be damaging not only to the product sale, but also to the sale of other products sold under the same brand name (impairing so-called "brand loyalty"). Finally, the Board has provided flexibility, under the existing consumer products program, to businesses whose situations warrant an extension to their compliance dates. For companies that can justify such variances, the additional time may afford more opportunity to explore different formulation, cost-cutting, performance-enhancing,

or other marketing strategies which can help make the transition to new complying products nearly transparent to consumers.

Potential Impact on Employment - The proposed measures are not expected to cause a noticeable change in California employment and payroll. According to *U.S. Department of Commerce*, California employment in most industries affected by the proposed measures was less than 152,000 in 2001, as shown in Table VIII-4, or about 10 percent of national employment in the affected industries. Employment data, however, were not available for four affected industries. This represents slightly over 1 percent of non-farm employment in California. These employees working in the 6,000 establishments generated about $5 billion in payroll, or about 11 percent of national payroll in the affected industries. This also accounts for about 0.9 percent of the total California non-farm payroll in 2001.

Table VIII-4
California Employment and Payroll in Affected Industries

NAICS	Number of Employees*		Payroll*	
	California	CA Share as % of US	California (million in 2001$)	CA Share as % of US
316213	246	2.0	5.2	1.9
325412	15,242	10.9	891.9	10.2
325520	2,151	9.7	114.2	11.6
325611	1,729	6.3	62.6	5.1
325612	1,480	6.4	54.8	5.8
325620	8,606	14.2	323.6	13.4
325998	2,560	6.7	113.1	6.4
421850	6,054	9.8	259.2	11.4
423120	N.A.	N.A.	N.A.	N.A.
423610	N.A.	N.A.	N.A.	N.A.
423840	N.A.	N.A.	N.A.	N.A.
424690	N.A.	N.A.	N.A.	N.A.
444110	38,952	10.6	975.5	11.0
446110	74,589	10.7	2,071.1	13.4
Total	151,609	10.4	4,871.2	11.3

Source: 2001 County Business Patterns: The U.S. Department of Commerce, Bureau of the Census.
N.A. – Not Available

Potential Impact on Business Creation, Elimination or Expansion - The proposed measures would 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 on a timely basis. Should the proposed measures impose significant hardship on these businesses, temporary relief in the form of a compliance date extension under the variance provision may be warranted.

On the other hand, the proposed measures may provide business opportunities for some California businesses or result in the creation of new businesses. California businesses which 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 measures would 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 certain consumer products regardless of their location, the staff's proposal should not present any economic disadvantages specific to California businesses.

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 variance provision of the Consumer Products Regulation, or through additional regulatory flexibility afforded by the IPP or the ACP Regulation (see Subsection G.).

C. ANALYSIS OF POTENTIAL IMPACTS TO CALIFORNIA STATE OR LOCAL AGENCIES

We have identified no State or local agency that would be affected by the proposed new limits. The California Prison Industry 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. However, the PIA does not manufacture any of the consumer products which are subject to the proposed new limits. The only chemically-formulated products the PIA currently sells are several lines of cleaning products consisting of bar soaps, powder bleaches, and liquid and powder detergents, none of which are subject to the proposed new limits (PIA, 2004). Based on these facts, we have determined that the proposed limits will not create costs or savings, as defined in Government Code section 11346.5(a)(6), to any State agency or in federal funding to the State, costs or mandate to any local agency or school district whether or not reimbursable by the State pursuant to Part 7 (commencing with section 17500), Division 4, Title 2 of the Government Code, or other nondiscretionary savings to local agencies.

D. ANALYSIS OF THE COST-EFFECTIVENESS (C.E.) OF THE PROPOSED LIMITS

Introduction

In the following analysis, we evaluate the anticipated cost-effectiveness of the proposed new limits. Such an evaluation 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, to an annual basis. We then report the ratio of the annualized costs to the annual emission reductions in terms of "dollars (to be) spent per pound of VOC reduced." For perspective, we compare the estimated cost-effectiveness of the proposed limits to the cost-effectiveness of other ARB regulations and control measures.

Methodology

The cost-effectiveness (C.E.) of a reduction strategy is generally defined as the ratio of total dollars to be spent to comply with the strategy (as an annual cost) to the mass reduction of the pollutant(s) to be achieved by complying with that strategy (in annual pounds). Annual costs include annualized non-recurring fixed costs (e.g., total research and development (R&D), product and consumer testing, equipment purchases/modifications, etc.) and annual recurring costs (e.g., raw materials, labeling, packaging, etc.).

We annualized non-recurring fixed costs using the Capital Recovery Method, as recommended under guidelines issued by the California Environmental Protection Agency (Cal/EPA). Using this method, we multiply the estimated total fixed costs to comply with the limits by the Capital Recovery Factor (CRF) to convert these costs into equal annual payments over a project horizon (i.e., the projected useful life of the investment) at a discount rate (Cal/EPA, 1996). We then sum the annualized fixed costs with the annual recurring costs and divide that sum by the annual emission reductions to calculate the cost-effectiveness of the regulation, as shown by the following general equation:

Cost-Effectiveness (1)

$$= \frac{\text{(Annualized Fixed Costs) + (Annual Recurring Cost)}}{\text{(Annual Mass Reduction in VOC)}}$$

where:

$$\text{Annualized Fixed Costs} = (\text{Fixed Costs}) \times \frac{i(1+i)^n}{(1+i)^n - 1} \quad (2)$$

$i(1+i)^n/((1+i)^n-1)$	=	Capital Recovery Factor (CRF)
i	=	discount interest rate over project horizon, %
n	=	number of years in project horizon
Fixed Costs	=	total nonrecurring cost per product category
	=	(Nonrecurring Cost per Product) x (Total Noncompliant Products in the Category)

As shown by the raw materials cost analyses in Appendix E, a convenient method for estimating the annual recurring cost portion of overall cost-effectiveness is to separate Equation (1) into two fractions, one for the nonrecurring costs and one for the recurring costs. It can then be shown that the C.E. fraction for recurring costs can be simplified and calculated as follows:

$$\text{Annual Recurring Costs C.E.} = \frac{\text{(Compliant Materials Cost) - (Baseline Materials Cost)}}{\text{(Baseline VOC Content) - (Compliant VOC Content)}} \quad (3)$$

where,

Baseline Materials Cost	=	cost of raw materials for product before reformulation to the proposed limit $/lb product
Baseline VOC Content	=	product VOC weight fraction before reformulation to limit, lb VOC/lb product
Compliant Materials Cost	=	cost of raw materials for compliant product, $/lb product
Compliant VOC Content	=	product VOC weight fraction of compliant product, lb VOC/lb product.

To use Equation (3), we determined typical VOC contents of both compliant and noncompliant products in each of the 26 product categories/subcategories, based on sales data and the speciated formulations as reported by manufacturers in the ARB's 2001 Consumer and Commercial Products Survey. To the extent feasible, we then determined the detailed formulations that most closely reflect the "typical" compliant and non-compliant VOC contents. These formulations, in turn, were designated as compliant and baseline formulations, respectively.

For most ingredients, we used the most recent, distributor-level bulk prices from the *Chemical Market Reporter* web site (CMR 2004). Costs for other ingredients were obtained from discussions with industry representatives, or from web searches of analytical grade chemicals. All of these data sources were used to calculate the baseline and compliant material costs based on these designated formulations. Unspecified ingredients or ingredients for which prices were unknown were grouped into an "all others" classification and assigned a default low and high cost of $3.50 and $7.00 per pound, respectively (ARB, 1997, *op cit*. at Volume II, p.56). These analyses are shown in Appendix E and discussed in more detail in "Analysis of Impacts to Raw Materials Cost" later in this section.

Assumptions

We calculated the cost-effectiveness with an assumed project horizon of 10 years, a commonly cited period for an investment's useful lifetime in the chemical processing industry. We also assumed a fixed interest rate of 10 percent throughout the project horizon. These assumptions are conservative and constitute standard practice in cost-effectiveness analyses of air pollution regulations, including previous consumer product rulemakings. Based on these assumptions, the Cost Recovery Factor (CRF) is 0.16275.

In the first Mid-Term Measures rulemaking, we assumed products reformulated to meet the proposed limits will be marketed throughout the U.S. by national marketers **(**ARB, 1997, VII-Ch-VIII, p.13). We found that businesses generally formulate for and distribute to the entire nation products compliant with our regulations rather than incurring the additional cost of setting up a California versus 49-state product distribution system. We believe the same strategy will be employed by companies subject to the proposed new limits; we therefore assumed in the Midterm II analysis that, for the annualized fixed cost portion of Equation (1), it was appropriate to use the fixed cost for national production divided by the national emission reductions.

However, an alternative but equivalent approach which we used in this analysis, is to report the California-apportioned (by population) annualized fixed cost divided by the California-apportioned emission reductions. To illustrate, a manufacturer may need to install $10 million worth of equipment to produce its national sales volume of products compliant with the proposed limits. However, if the company were to produce a California and 49-state product, the company may only need to install $1 million worth of equipment to produce unit sales sufficient for the smaller California market. Using this alternative approach, we discounted the total fixed costs for producing national sales volumes by the California-apportionment factor (i.e., the current ratio of California to U.S. population, or 13 percent), which we then divided by the California-only emission reductions. It is important to note that, while both of the approaches described above -- the national marketing and California-only approaches -- reach the same conclusion, they do so for different reasons as discussed above.

For the annual recurring costs, we assumed compliant reformulations would result in cost changes as a result of changes in a product's raw materials and their associated prices. Except for the Tier 2 limit for Shaving Gel, changes in packaging, labeling, distribution and other recurring costs were assumed to be negligible relative to baseline levels of these costs. This assumption is based on our previous regulatory experiences. To illustrate, in 1996, we conducted a comprehensive technical assessment of the 55 percent VOC hairspray limit, which required extensive reformulations and revolutionary changes to existing products (ARB, 1997a). The hairspray limit is generally considered to be among the most challenging of the consumer product limits; it likely resulted in more changes to the regulated product, relative to pre-regulatory products, than any other VOC limit. However, our assessment found that changes to recurring costs other than hairspray raw material costs were expected to be negligible (*Id*, Vol-II, p.54). Based on this finding and because the proposed new limits are designed to preserve product forms, we believe our assumptions regarding the recurring costs are reasonable.

Results

A review of relevant technical literature and industry trade journals provided little information that we could use to estimate costs directly. This is not surprising, because the consumer products industry is very competitive, and production cost data specific to a company are closely-guarded trade secrets. In addition, we have had very limited success with cost surveys in the past and did not expect one to provide much useful information in this rulemaking (e.g., during the Phase II rulemaking, cost survey responses from only three manufacturers were received out of several hundred that were mailed; ARB, 1991). We therefore developed estimates for the non-recurring costs based on analogous costs reported by ARB staff for the Phase II consumer products rulemaking (*Id*, Appendix D1). The Phase II non-recurring costs are applicable for this analysis since they were based on staff's detailed estimates of labor, R&D, equipment purchase, and other costs involved in product reformulations for generic household, automotive, and personal care categories, all of which are included in proposed limits. This is the same approach we used for the 1997 Mid-Term Measures rulemaking and the 1999 Mid-Term Measures II rulemaking.

The Phase II non-recurring investment costs, reported in 1991 dollars, were adjusted to 2003 dollars using a well-established method of ratioing chemical engineering plant cost indices as follows (Peters and Timmerhaus, 1980):

$$Non-\text{Re}curring\ Costs\ (in\ 2003\ dollars) = \frac{Non-\text{Re}curring\ \ Costs\ (in\ 1991\ dollars)}{10} \times \frac{C.E.\ 2003\ Index}{C.E.1991\ Index} \quad (4)$$

where,

C.E. 2003 index = 2004 Chemical Engineering Plant Cost Index = 405.7 (*Chemical Engineering*, March 2004).

C.E. 1991 index = 1997 Chemical Engineering Plant Cost Index = 361.3 (*Chemical Engineering*, April 1997).

We believe the original Phase II cost estimates were beneficial at the time of the rulemaking for predicting the costs to comply with those limits. However, it was discovered during Midterm II that these original cost estimates grossly overestimated the true non-recurring costs for Phase II by a factor of ten (ARB, 1999, op cit. at Vol II, Chapter VIII, Page 211). We therefore estimated the non-recurring costs for the proposed new limits by adjusting the Phase II estimates to be consistent as shown in Equation (4).

Table VIII-5 shows our estimates for per-product and total annualized non-recurring costs for each of the 26 product categories/subcategories subject to the proposed limits. As shown, we project a per-product annualized non-recurring cost ranging from a low of about $8,500 to a high of about $124 thousand dollars. With over 600 noncompliant products that would need to be reformulated, the overall total annualized fixed cost to industry is projected to range from about $1.3 million to just more than $5 million dollars per year, with a general breakdown of this range as follows: household care products (77 percent), personal care products (22 percent) and adhesives (<1 percent).

We have received information from industry specific to the possible significant additional costs that would be incurred to comply with the second tier Shaving Gel limit. While some manufacturers could reformulate products and continue to use their current packaging system, it is likely that some other manufacturers would need to employ a different packaging system to meet the proposed 4 percent VOC limit, effective December 31, 2009. Where a new packaging system is needed, certain manufacturers believe that compliance could require a complete replacement of manufacturing lines rather than the re-tooling of an existing line, which would result in significant additional capital costs. Staff did not add these possible additional costs to the calculations used to determine the economic impacts specific to Shaving Gels because it was indicated that not all manufacturers would need to replace existing lines. However, staff has committed to perform a detailed technical assessment of the second tier, 4 percent VOC limit for Shaving Gel at least one year prior to the December 31, 2009 effective date. This technical assessment will include an evaluation of the manufacturers' progress and costs in reformulating Shaving Gels to the 4 percent limit. Based on the results of the technical assessment, staff may adjust the proposed VOC limit or effective date prior to December 31, 2009.

Our analysis shows that the cost-effectiveness of the proposed requirements is similar to the cost-effectiveness of other existing ARB regulatory programs. We estimate the total overall cost effectiveness of the initial proposed limits and other requirements to be about $2.00 per pound of VOC reduced. Further when accounting for the proposed second tier Shaving Gel limit, we estimate the overall cost effectiveness to be about $2.40.

It should be noted that a contributing factor to the total average cost per pound of VOC reduced was that the VOC emission reductions achieved from some of the proposed limits specific to individual categories would be quite low. As a result of prohibiting the use of methylene chloride, perchloroethylene, and trichloroethylene, from several categories, including Adhesive Remover, Anti-static Product, Contact Adhesive, Electrical Cleaner, Electronic Cleaner, and Graffiti Removers, significant reductions of toxic compounds would be realized in these categories. To meet the requirements of the regulation manufacturers will need to replace functional toxic compounds with non toxic VOC alternatives. When factoring in the reformulation costs relative to only the VOC benefits, the result is a high cost per pound of VOC reduced. However, if the fact that significant reductions in toxic compounds was considered, the cost effectiveness of regulating the product categories would be quite different. In addition, for other categories, reductions from a specific category product form may also be quite low. A limit may have been set largely as a cap, with the few reductions being achieved resulting in a few VOC reductions and a low cost effectiveness. While the costs incurred by manufacturers to reformulate small categories is not excessive, when those costs are apportioned to a relatively small emission reduction, the cost effectiveness may appear low. Therefore, when presenting the cost effectiveness of the proposal, one should consider the effect of relatively low cost effectiveness (high cost per pound of VOC reduced) in some categories.

[INSERT TABLE VIII-5]
Estimated Total Non-Recurring Fixed Costs to Comply with Proposed Limits

Table VIII-6 shows a comparison of the cost-effectiveness for the proposed limits relative to other ARB consumer product regulations and control measures. As shown, the cost-effectiveness range of the staff's proposal is consistent with the cost-effectiveness of other ARB regulations and programs. As expected, costs for the proposed 2004 Amendments are in some cases higher than other recent consumer products measures. These higher costs can be attributed to regulating smaller emitting and/or more challenging categories than in the past.

Table VIII-6
Comparison of Cost-Effectiveness for ARB Consumer Product Regulations/Measures (adjusted to *2003* dollars)

Regulation/Control Measure	Cost-Effectiveness (Dollars per Pound VOC Reduced)
2004 Amendments (Current Proposal)[1]	$2.01 to $2.34
Mid-Term Measures II Consumer Products[2]	$0.40
Mid-Term Measures Consumer Products[3]	$0.25
Hairsprays[4]	$2.10 to $2.50
Aerosol Coating Products[5]	$2.85 to $3.20
Phase II Consumer Products Regulation[6]	<$0.01 to $1.10
Phase I Consumer Products Regulation[7]	net savings to $1.80
Antiperspirants and Deodorants[8]	$0.54 to $1.30
Architectural and Industrial Maintenance Coatings[9]	net savings to $6.90

Cost-effectiveness values for previous years adjusted to 1997 dollars using the following *Chemical Engineering* Plant Cost indices: 383.4 (1997), 381.1 (1995), 361.3 (1991), and 357.6 (1989-1990); *Chem. Eng.*, April 1996/1997.

1 Categories where reduction of toxic air contaminant emissions occurred were included.
2 ARB, 1999.
3 Range reported as min./max. for each individual Phase III limit; average C.E. of $0.25/lb reduced reported as an emission reductions-weighted average cost-effectiveness; ARB, 1997.
4 Reported as sales-wtd average, incremental 2nd-tier cost-effectiveness (80% VOC to 55% VOC); ARB, 1997.
5 ARB, 1995.
6 ARB, 1990.
7 ARB, 1991.
8 ARB, 1989a.
9 Suggested Control Measure, developed with the California Air Pollution Control Officers Association; ARB, 1989b.

E. ANALYSIS OF THE IMPACTS TO RAW MATERIALS COST

Introduction

In this analysis, we evaluated the anticipated cost impacts from the proposed limits on raw material costs. As stated previously, the raw material costs generally constitute the major portion of the compliance costs for most categories. However, evaluating the impacts to raw material costs provides only an indicator of possible impacts to the retail prices of the affected products (assuming the cost impacts are passed on partially or fully to consumers). Because of unpredictable factors such as the highly competitive nature of the consumer products market, it is not possible to accurately predict the final retail price of products that will comply with the proposed limits when they become effective. To the extent the cost impacts are passed on to consumers, the final retail prices may be lower or higher than suggested by this analysis.

Methodology

As discussed previously, we determined the detailed formulations which most closely reflect the "typical" compliant and noncompliant VOC contents. These formulations, in turn, were designated as compliant and baseline formulations, respectively. Distributor-level ingredient prices from *Chemical Market Reporter* web site (CMR, 2004a) or from discussions with industry representatives were used to calculate the baseline and compliant material costs for these formulations. Other sources of cost information were used for selected ingredients as discussed previously. Unspecified ingredients or ingredients for which prices were unknown were grouped into an "all others" classification and assigned a default low and high cost of $3.50 and $7.00 per pound, respectively (ARB, 1997, *op cit*. at Volume II, p.56). These analyses and the detailed formulations evaluated (with individual weight fractions and unit prices per pound) are shown as cost spreadsheets in Appendix F. While these formulations may not reflect the exact composition of existing noncompliant products and compliant products that will be marketed, we believe they are reasonably representative for the purposes of this analysis.

Assumptions

As noted previously, we assumed changes in packaging, labeling, distribution and other recurring costs to be negligible relative to baseline levels of these costs (ARB, 1997). The most likely pathway for re-formulation was assumed for non-compliant products. Despite this assumption, alternative formulations using non-VOC propellants, compressed gases, or dimethyl ether (DME), or some combination with these or existing technologies may allow lower-cost compliant products than shown in our analysis.

Results

As shown in Table VIII-7, the anticipated raw materials cost changes range from no cost (net savings or no cost) to about $1.34 increase per unit (for a gallon of floor and wall covering adhesive remover).

[INSERT TABLE VIII-7]
Estimated Impacts to Raw Materials Cost ($/Unit of Product) for Proposed Limits

[INSERT TABLE VIII-7]
Estimated Impacts to Raw Materials Cost ($/Unit of Product) for Proposed Limits continued

Table VIII-8 shows a comparison of the impacts to raw materials cost under the proposed limits relative to those of other ARB consumer product regulations.

Table VIII-8
Comparison of Raw Materials Cost Impacts for the Proposed Limits and Other ARB Consumer Product Regulations (unadjusted dollars)

Regulation	Cost Impacts (Dollars per Unit of Product)
2004 Amendments (Current Proposal) [1]	$0.00 to $0.77
Mid-Term Measures II[2]	$0.00 to $0.25
Phase III (Mid-Term Measures 1) Consumer Products Regulation[3]	$0.00 to $0.60
Hairsprays[4]	($0.10) to $0.45
Aerosol Coating Products[5]	$0.30 to $0.34
Phase II Consumer Products Regulation[6]	<$0.01 to $0.60
Phase I Consumer Products Regulation[7]	net savings to $0.25
Antiperspirants and Deodorants[8]	$0.25

1 A worst case raw material cost per unit of $1.34 was estimated for products packaged in gallon containers.
2 ARB, 1999.
3 Phase III Staff Report; ARB, 1997
4 $0.45/unit reported as a worst-case scenario using high-level of HFC-152a as propellant in “premium” products. ARB, 1997.
5 ARB, 1995.
6 ARB, 1991.
7 ARB, 1990.
8 Estimate based on assumption of using HFC-152a to replace HC propellants and meet the 0 percent HVOC limit.

F. ANALYSIS OF THE COMBINED IMPACTS ON PER-UNIT COST FROM RECURRING AND NONRECURRING COSTS

Introduction

In this analysis, we evaluated the combined impacts of both recurring (i.e., raw materials costs) and nonrecurring costs from the proposed limits on per-unit costs. Although the raw material costs generally constitute the major portion of the compliance costs, in some categories, the nonrecurring (fixed) cost was the major contributor. In performing this analysis, we used the fixed costs, raw material costs, assumptions, and other facts discussed previously.

Methodology

Discussion of Non-recurring costs

Historically, staff has considered a variety of costs in its calculations to determine the costs of complying with proposed VOC limits affecting consumer products. In the 1991 Phase II Consumer Products Rulemaking, staff developed a methodology to determine non-recurring reformulation costs (non raw material costs) for proposed VOC limits. These costs were broken down by each process needed for reformulation to occur. (ARB, 1991). It was subsequently determined through a thorough cost analysis of the reformulations that were done to comply with the 55 percent VOC limit for hairspray, that these costs were over estimated by a factor of 10. It was widely believed that the 55 percent VOC limit for hairspray represented the most aggressive, challenging, and expensive reformulation that had been required by the Consumer Products Regulations. Therefore, subsequent cost analysis grew the factors by the (Chemical Engineering Plant Cost Index) then divided these reformulation factors by 10 (see equation (4)).

There are many variables in producing a product for market, and assumptions about those variables will greatly affect the outcome of any cost analysis. For each assumption, a test of "reasonableness" was applied to determine if this was a likely approach to take or if the event had a high probability of occurring. Results were also compared to data provided by other agencies and industry to verify that the numbers are "reasonable." In all cases, only new or additional costs were considered, and not costs that would have been expected in the normal course of business if the regulation had not been in effect.

To estimate non-recurring cost numbers, the staff considered two cost estimate approaches for each product category, one for low cost, and one for high cost, with a different set of assumptions for each approach. To further refine the analyses, the product categories proposed for regulation were grouped under the subheadings "household care," "personal care," and "adhesives" to better reflect the impact on each category.

Approach

For a systematic approach to the cost analysis, the entire time from initial statement of development goals to final delivery of the new product to the marketplace shelves was divided into eight phases. The phases are: product development, including reformulation and development of a new delivery system if necessary; stability testing; efficacy testing; safety testing; labeling modification; registration with regulatory agencies if necessary; manufacturing change; and marketing. The length of time in each phase was estimated based on an industry analysis of 80 new product innovations. Most of the phases occur in sequence; however, there is some time overlap in each phase.

Next, estimated personnel resources were allocated against each phase considering the most probable types of skills needed including general engineering, technician; drafting; packaging engineering; specification engineering; model making; chemical engineering; technical publication; production support; quality assurance; marketing; warehousing; word processing; and clerical. For high cost elements, additional personnel were allocated to each phase.

After the personnel costs were determined, additional cost elements were considered at each phase and added as appropriate. These costs elements are facility cost; equipment cost; tool; jig; fixture and miscellaneous materials handling equipment; purchased material; packaging costs; distribution costs; warehousing; technical data; research studies and tests; promotional literature; residual inventory and disposal; consumer tests; general and administrative expense; patent cost; registration fees; and computer support. The result of these considerations is a per-product cost for developing a reformulated product and putting it on the market.

Assumptions

The staff used different assumptions for the low and high cost analyses, and considered the specific likelihood that each of the cost elements would occur for each product category individually. In reviewing the ARB Consumer Products Survey, the staff found that many of the products which would technically be non-complying are within a couple of percentage points of VOC weight from being in compliance with the standard. These products may require only minor modification to their current formulation to come into compliance. For the low cost analysis then, no major costs were added for changing delivery systems or other product attributes.

Since the products did not change significantly, they would not require any major retooling of manufacturing equipment, technical data changes would be minor, and it was assumed that the change in marketing costs would be small. It was also assumed that these reformulated products would be marketed nationally.

For the high cost approach, each category was analyzed individually to determine which of the elements discussed above manufacturers would likely include in their reformulation efforts. High costs for specific steps of the reformulation process were only included in the cost analysis where staff believed they were likely to occur. If staff believed a markedly different product would be needed to comply with the proposed limit, such as a new delivery system, then high personnel and capital resources especially in product development and manufacturing change were assumed. In addition, a new delivery system would require investment for prototypes, new filling machines training, and technical data, so these high costs were also included in these scenarios. Additional costs were also added for packaging, distribution and warehousing.

For especially challenging limits, it was assumed for the high cost approach that, because of a markedly different product, there would also be additional marketing costs,

including research studies and tests, promotional literature, and consumer tests. These costs vary by the type of product, with household products typically having a larger expense in this area. The cost analysis did not include the costs for an extensive advertising campaign. New products are regularly brought onto the market, and the advertising for a new product, whether reformulated or not, would replace the advertising for the existing product, and would be a normal cost. It was assumed that the new product would be marketed nationally.

The staff also recognized that development of a new product does not occur in isolation. Few companies have only one product line for those that have more than one product line, the product lines can be very similar. Development and production tasks, from the initial concept through marketing, would be proceeding simultaneously on more than one product line, with a transfer of information and work-sharing between the products. For these companies, this "technology transfer" would substantially reduce the cost of developing and marketing a new product on a per product basis.

Therefore, staff has considered only non-recurring costs that are likely to occur on a per category basis. If it was determined that for a majority of products in the category, the most likely scenario was that only minor changes to the product's reformulation were necessary to comply with the new proposed limit then only the lower end of the non-recurring cost were included. For some categories, it was appropriate based on the variety of products and reformulation approaches needed to meet the proposed limit, that certain high cost factors be included in the analysis but not others on a case by case basis. We believe that this approach gives a more realistic estimate of the costs of a given limit.

Results

As shown in Table VIII-9, the combined fixed and raw material cost changes to per-unit production costs ranged from no cost increase (net savings or no cost for various categories) to about $2.03 per unit (for a gallon of graffiti remover). Averaged over all of the non-complying products affected by the proposed limits and other requirements, the average cost increase is about $0.16 per unit.

[INSERT TABLE VIII-9 HERE]

G. OTHER POSSIBLE ECONOMIC IMPACTS

Impacts of Proposed Regulatory Changes

Beyond the VOC limits, there are other proposed changes to the Consumer Products Regulation, some of which may have a potential to economically impact affected businesses. While we do not expect any significant economic impact from any of the proposals, it is possible that there could be some increased cost to business resulting from proposed changes to the most restrictive limit provision, new product labeling requirements, and new reporting of the use of toxic compounds requirements.

We have already calculated economic impacts on businesses in terms of cost to reformulate products to meet VOC limits. As part of that analysis it is assumed that there are various plant process changes and other costs, including re-labeling of products. Those costs were already reflected in the economic analysis where reformulating is required. We believe there may be some products that do not need to reformulate, because they already comply with the VOC limits, but they may need to re-label because of other proposed changes to the regulation. We have included the estimated labeling costs specific to Special Purpose Contact Adhesives, as it is the only category where all of the products in the category would not be required to reformulate, but will be required to re-label.

Another proposed change to the regulation that may cause manufacturers to re-label their products would apply to manufacturers of Adhesive Removers, Contact Adhesives, Electronic Cleaners, and Electrical Cleaners and Energized Electronic Cleaners. As proposed, the change would require manufacturers to place a category or sub category identification code on the label and add the VOC limit for the applicable category or subcategory. This code is necessary to identify the regulatory category that a product is subject to as it may not be apparent from the label for products in these categories. Addition of the category code will necessitate product re-labeling.

Finally, costs could be incurred for Energized Electrical Cleaners for new reporting requirements. Energized Electrical Cleaners would be required to report their usage of perchloroethylene and methylene chloride on an annual basis. There could be increased administrative costs to companies in quantifying toxic compound use for their products and preparing the reports that are submitted to ARB. In the past these costs have been estimated to be about $300 per company per year.

For the proposed changes to the most restrictive limit and the new proposed product labeling requirements, it is possible that some businesses may incur cost by needing to re-label their products. Staff has historically used a cost of $1,000 to $2,000 (1991 base year, grown to present by the CPI) for each label change. However, some manufacturers have recently provided an estimate of $10,000 dollars per product. Manufacturers periodically and often make changes to product labels for various reasons. Because the regulation does not require that manufacturers comply with provisions that would require label changes until December 31, 2006, we believe that in

most cases, the needed changes would be made at a time when the label is being changed for some other reason.

Potential Impacts on Producers of Para-dichlorobenzene

Manufacturers of para-dichlorobenzene (PDCB) are likely to see a decline in sales as a result of this regulation. The demand for PDCB in this country was 68 million pounds per year in 2003 based on the Chemical Market Reporter (CMR, 2004b). Of this 68 million pounds, or 93 tons per day, we expect to reduce production by about 3 tons per day. Such a reduction represents a 3 percent reduction in overall production. For companies solely producing PDCB (we know of none in the U.S.), a 3 percent decline in revenues may occur. All manufacturers and retailers of PDCB, to staff's knowledge, either produce or sell additional chemicals or products, hence the actual reduction in revenues will represent a lesser portion of their revenue. These manufacturers include Monsanto Company, PPG Industries, Standard Chloride of Delaware and Dow Chemical.

H. MITIGATION OF POTENTIAL IMPACTS THROUGH ADDITIONAL REGULATORY FLEXIBILITY

If adopted by the Board, the proposed limits will be incorporated in section 94509 of the Consumer Products Regulation (title 17, California Code of Regulations, §§94507-94517). To complement the mandatory VOC limits specified in section 94509, the existing consumer products program provides a very high degree of compliance flexibility to mitigate cost impacts as much as possible, through two voluntary, market-based programs: the IPP and the ACP Regulation. The IPP established in section 94511 (title 17, CCR), allows qualified manufacturers to sell products that have VOC contents greater than the applicable VOC limit, provided they demonstrate that such products actually emit less VOCs than representative products that comply with the VOC limit. Using the emissions trading approach, the ACP is a voluntary regulation (title 17, CCR, §§94540-94555) designed to allow multi-product VOC averaging as an alternate means of complying with the VOC limits.

Various manufacturers have formulated technologically-advanced, IPP products that are more concentrated, higher in efficacy, or have some other chemical or physical properties that permit users to release less VOCs when using such products. To date, 14 manufacturers have submitted, and obtained approval for, 25 IPP applications involving 23 products. Based on their participation in the program, it is reasonable to conclude that manufacturers are using this program to provide consumers with products that meet their needs, while lowering costs, improving the "market value" of their products, or otherwise maintaining profit margins.

The potential benefits of emissions averaging or "bubbling" for consumer product manufacturers under the ACP regulation have been documented by ARB staff (ARB, 1994). In general, emissions averaging under approved ACP plans allows manufacturers to choose the least-cost or other advantageous reformulation options for

its product lines. Rather than directly complying with each and every VOC limit, manufacturers can choose to "overcomply" with some reformulations in order to offset the "undercompliance" of other product lines. The ACP regulation requires the net resulting emissions from products under such averaging plans to be no greater than the level which would have resulted had all the products under the ACP bubble directly complied with the applicable limits. In short, the same emission reductions are achieved while providing a high degree of formulation and marketing flexibility to manufacturers. To date, three manufacturers have implemented approved ACP averaging programs, reducing VOC emissions by about 4.9 million pounds more than would have occurred under the mandatory VOC limits. We anticipate that such emissions averaging will also benefit manufacturers subject to the proposed limits.

Overall, most affected businesses will benefit from the IPP and the ACP Regulation. Both programs are completely voluntary and impose no additional costs to businesses to meet their requirements other than testing and reporting requirements. Manufacturers who take advantage of these market-based programs presumably do so because it costs less than direct compliance with the limits or it provides some other market benefits.

According to previous staff analyses, the potential cost differential which might result from competition under the ACP between small and large firms would not necessarily cause extreme hardship on small firms (*Id.* at Vol.II, X-13). However, inclusion of the proposed limits in the ACP regulation may increase the level of competition for some products and may lead to the elimination of some marginal producers for those products. Such competition may also have minor impacts on California employment and payroll. However, the impact is expected to be positive in the long term. Any potential impacts on the ability of California businesses to compete with businesses in other states are also expected to be minimal.

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