California Environmental Protection Agency

Air Resources Board

INITIAL STATEMENT OF REASONS FOR THE PROPOSED AMENDMENTS TO THE CALIFORNIA AEROSOL COATING PRODUCTS, ANTIPERSPIRANTS AND DEODORANTS, AND CONSUMER PRODUCTS REGULATIONS, TEST METHOD 310, AND AIRBORNE TOXIC CONTROL MEASURE FOR PARA-DICHLOROBENZENE SOLID AIR FRESHENERS AND TOILET/URINAL CARE PRODUCTS

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State of California
AIR RESOURCES BOARD

INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING

Public Hearing to Consider

PROPOSED AMENDMENTS TO THE CALIFORNIA AEROSOL COATING PRODUCTS, ANTIPERSPIRANTS AND DEODORANTS, AND CONSUMER PRODUCTS REGULATIONS, TEST METHOD 310, AND AIRBORNE TOXIC CONTROL MEASURE FOR PARA-DICHLOROBENZENE SOLID AIR FRESHENERS AND TOILET/URINAL CARE PRODUCTS

To be considered by the Air Resources Board on June 24, 2004, at:

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9530 Telstar Avenue
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Air Resources Board
P.O. Box 2815
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State of California
AIR RESOURCES BOARD

INITIAL STATEMENT OF REASONS FOR THE FOR THE PROPOSED AMENDMENTS TO THE CALIFORNIA AEROSOL COATING PRODUCTS, ANTIPERSPIRANTS AND DEODORANTS, AND CONSUMER PRODUCTS REGULATIONS, TEST METHOD 310, AND AIRBORNE TOXIC CONTROL MEASURE FOR PARA-DICHLOROBENZENE SOLID AIR FRESHENERS AND TOILET/URINAL CARE PRODUCTS

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May 2004

Initial Statement of Reasons for Proposed Amendments to the California Aerosol Coating Products, Antiperspirants and Deodorants, and Consumer Products Regulations, Test Method 310, and Airborne Toxic Control Measure for Para-dichlorobenzene Solid Air Fresheners and Toilet/Urinal Care Products

Volume I: Executive Summary

Volume II: Technical Support Document

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This report and the proposed amendments to the California Aerosol Coating Products, Antiperspirants and Deodorants, and Consumer Products Regulations, Test Method 310, and Airborne Toxic Control Measure for Para-dichlorobenzene Solid Air Fresheners and Toilet/Urinal Care Products were developed by the following Air Resources Board staff:

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Initial Statement of Reasons for Proposed Amendments to the California Aerosol Coating Products, Antiperspirants and Deodorants, and Consumer Products Regulations, Test Method 310, and Airborne Toxic Control Measure for Para-dichlorobenzene Solid Air Fresheners and Toilet/Urinal Care Products

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Volume I:
Executive Summary

EXECUTIVE SUMMARY

A. INTRODUCTION

This report is the Initial Statement of Reasons for Proposed Rulemaking required by the California Administrative Procedure Act. In this report, the Air Resources Board (ARB/Board) staff presents the proposed amendments (the "2004 Amendments") to the California Regulation for Reducing Volatile Organic Compound (VOC) Emissions from Consumer Products (the "Consumer Products Regulation"), Regulation for Reducing Volatile Organic Compound Emissions from Antiperspirants and Deodorants ("Antiperspirants and Deodorants Regulation"), Regulation for Reducing the Ozone Formed from Aerosol Coating Product Emissions (the "Aerosol Coating Products Regulation") and to test Method 310. We are also proposing an Airborne Toxic Control Measure (ATCM) for Para-dichlorobenzene (PDCB) Solid Air Fresheners and Toilet/Urinal Care Products. Appendix A contains the proposed amendments.

The proposed 2004 Amendments are designed to meet the ARB's statutory requirement to achieve the maximum feasible reductions from consumer products, to meet the 2003 State and Federal State Implementation Plan for Ozone (SIP) commitments, and fulfill the requirements of a lawsuit settlement agreement with environmental groups regarding ARB's progress under the SIP (U.S. District Court, Central District of CA, Case No. CV-97-6916 JSL (SHx)).

In this Executive Summary, we provide a discussion of the staff's proposed amendments (the "2004 Amendments") to the Consumer Products Regulation, the Antiperspirants and Deodorants Regulation, the Aerosol Coating Products Regulation and test Method 310, and explain the rationale for the proposed changes. We also summarize the proposed ATCM for PDCB. A more detailed discussion in Chapter V of the Technical Support Document is intended to satisfy the requirements of Government Code section 11346.2(a)(1), which requires that a noncontrolling "plain English" summary of the regulation be made available to the public.

B. HISTORY AND BACKGROUND

1. Consumer Products Emissions

A consumer product is defined as a chemically formulated product used by household and institutional consumers. Consumer products include, but are not limited to: detergents; cleaning compounds; polishes; floor finishes; cosmetics; personal care products such as antiperspirants and hairsprays; home, lawn and garden products; disinfectants; sanitizers; automotive specialty products; and aerosol paints. Emissions from other paint products, such as furniture or architectural coatings, are not part of ARB's consumer products program because local air districts regulate them.

Consumer products are a significant source of VOC emissions in California and contribute to the formation of both ozone and particulate matter pollution. Although each consumer product may seem to be a small source of emissions, the cumulative use of these products by over 35 million Californians results in significant emissions. Consumer products accounted for approximately 267 tons per day (tpd) of VOC emissions in the year 2000, which comprised about eight percent of the total man-made VOC emissions statewide. Even with significant reductions from control measures adopted by ARB factored in, due to growth, consumer products emissions are projected to be 260 tpd by 2010 and at that time make up about 12 percent of the VOC emissions projected to be emitted. Further reductions in VOC emissions from consumer products and other VOC sources are needed if ozone standards are to be achieved.

As a result of several regulations adopted by the ARB over the last fifteen plus years, emissions from consumer products and aerosol coatings have decreased significantly, and continued reductions are projected through 2005. As a result of these measures, emissions statewide from consumer products will have been reduced by over 130 tpd VOC (40 percent reduction) by 2005. Due to population growth, and without additional controls, staff expects the trend of emissions reductions to reverse once the last of the already adopted standards takes effect in 2005.

2. Consumer Product Regulations Adopted to Date

In 1988, the Legislature enacted the California Clean Air Act (CCAA or "the Act"), which declared that attainment of the California state ambient air quality standards is necessary to promote and protect public health, particularly of children, older people, and those with respiratory diseases. The Legislature also directed that these standards be attained by the earliest practicable date.

The CCAA added section 41712 to the California Health and Safety Code (HSC), which requires the ARB to adopt regulations to achieve the maximum feasible reduction in reactive organic compounds (ROCs) emitted by consumer products (note: ROC is equivalent to VOC). As part of the regulatory adoption process, the ARB must determine that adequate data exist for it to adopt the regulations. The ARB must also find that the regulations are necessary, technologically and commercially feasible, and do not eliminate a product form. In enacting section 41712, the Legislature gave the ARB clear new authority to control emissions from consumer products, an area that had previously been subject to very few air pollution control regulations.

To date, the Board has adopted the following regulations to fulfill the requirements of the California Clean Air Act as it pertains to consumer products:

- Antiperspirants and Deodorants Regulation
- Consumer Products Regulations
- Alternative Control Plan
- Aerosol Coating Products Regulation
- Hairspray Credit Program Regulation

Details pertaining to each of the above listed regulations can be found in Appendix B of the Technical Support Document for this rulemaking.

3. California's SIP and Consumer Products

On October 23, 2003, the ARB adopted *the Proposed 2003 State and Federal Strategy for the California State Implementation Plan* (Statewide Strategy) which reaffirms the ARB's commitment to achieve the health-based air quality standards through specific near-term actions and the development of additional longer-term strategies. The Statewide Strategy identifies the Board's near-term regulatory agenda to reduce ozone and particulate matter by establishing enforceable targets to develop and adopt new measures for each year from 2003 to 2006, including commitments for the Board to consider 19 specific measures. It also sets into motion a concurrent initiative to identify longer-term solutions to achieve the full scope of emission reductions needed to meet federal air quality standards in the South Coast and San Joaquin Valley by 2010. In addition to meeting federal requirements, this Statewide Strategy ensures continued progress towards California's own health-based air quality standards.

The ARB and local air districts are in the process of updating the California SIP to show how each region in the state will meet the federal air quality standards. The measures outlined in the adopted Statewide Strategy are being incorporated into these SIP revisions. The South Coast's 2003 Air Quality Management Plan was adopted by the South Coast Air Quality Management District Governing Board on August 1, 2003. The ARB approved the local SIP element on October 23, 2003, and on January 9, 2004, the ARB submitted to the United States Environmental Protection Agency (U.S. EPA) both the Statewide Strategy and the 2003 South Coast SIP as revisions to the California SIP. The new SIP updates all elements of the approved 1994 SIP and includes additional consumer products measures. Upon approval by U.S. EPA, the 2003 SIP will replace the State's commitments in the 1994 SIP. The ARB is currently working with the San Joaquin Valley Unified Air Pollution Control District on a revision to the San Joaquin Valley's ozone SIP. The revised San Joaquin Valley SIP is scheduled for consideration by the District's Governing Board and by the ARB later this year.

Together with significant reductions from stationary industrial facilities, mobile sources, and other areawide sources, the reductions in the consumer products element of the SIP are an essential part of California's effort to attain the air quality standards. Two specific measures and one longer term, less specific measure from the Statewide Strategy and the 2003 South Coast SIP are intended to reduce emissions from consumer products:

- **Measure CONS-1: Set New Consumer Products Limits for 2006.** The ARB committed to develop a measure to be proposed to the Board between 2003 and 2004, and implemented by 2006, that would achieve VOC emission reductions from consumer products of at least 2.3 tons per day (tpd) in the South Coast Air Basin in

2010. Statewide, this measure would achieve 5.3 tpd in emission reductions by 2010.

- **Measure CONS-2: Set New Consumer Products Limits for 2008-2010.** The ARB committed to develop new consumer product category limits to be proposed to the Board between 2006 and 2008, with implementation in 2008 and 2010, that would achieve VOC emission reductions from consumer products of between 8.5 tpd and 15 tpd in the South Coast Air Basin in 2010. Statewide, this measure would achieve 20-35 tpd in emission reductions by 2010.

- **Further Reductions from Consumer Products.** In addition, it is expected that further emission reductions will be needed from all source categories, including consumer products, to meet the long-term emission reduction targets included in the South Coast SIP. As such there is an ongoing commitment to pursue additional technologically and commercially feasible reductions in consumer product emissions.

The proposed amendments to the Consumer Products Regulation presented in this report are intended to fulfill the commitment for SIP measure CONS-1.

On April 15, 2004, U.S. EPA designated all or parts of 35 counties nonattainment for the new eight-hour ozone standard effective June 15, 2004. Many of these areas are already nonattainment for the federal one-hour standard. New nonattainment areas include a number of rural Sierra foothill counties and additional parts of the Sacramento Valley. This action starts the transition from the one-hour standard to the eight-hour standard. The one-hour standard will be revoked on June 15, 2005, one year after the effective date of the designation, and SIPs showing how each area will meet the eight-hour standard are due by 2007. In order to maintain progress towards clean air, the federal Clean Air Act prohibits backsliding on the control program. Since the eight-hour standard is more health-protective than the federal one-hour standard, ARB expects that California will need to reduce emissions beyond the existing one-hour SIP targets.

4. SIP Lawsuit and Settlement

In 1997, three environmental groups (Communities for a Better Environment, the Coalition for Clean Air, and the Natural Resources Defense Council) filed a complaint in the United States District Court for the Central District of California. The lawsuit was filed against the ARB, the South Coast Air Quality Management District, and the U.S. EPA related to California's progress in achieving the 1994 SIP commitments. The ARB reached a settlement agreement with these groups in January 1999 which was amended in December 1999 and June 2003 (U.S. District Court, Central District of CA, Case No. CV-97-6916 JSL (SHx)). Although the 2003 SIP revision is intended to replace the State's original commitments under the 1994 SIP for the South Coast, the settlement agreement will remain in place until the ARB fulfills its obligations under the agreement.

The agreement includes a list of measures to be considered by the ARB and a schedule. In one of the specific measures, the ARB staff committed to propose to the Board by June 30, 2004, a control measure for a 2 tpd VOC emission reduction in the South Coast Air Basin, if feasible. The implementation period for the control measure is 2006. The amendments proposed in this report are intended to fulfill this commitment and to partially fulfill the remaining VOC reduction commitment in the lawsuit settlement agreement.

C. SUMMARY OF PROPOSED AMENDMENTS

1. Why are we proposing amendments to the Consumer Products Regulation?

We are proposing amendments to meet our SIP commitment for 2004, termed "CONS-1," and to fulfill the conditions of a SIP lawsuit settlement agreement. These two commitments are discussed in Subsection B of this Executive Summary. Specifically, the 2004 Amendments will fulfill CONS-1, achieving at least 5 tpd VOC emission reduction statewide by 2006, and it will achieve a 2 tpd emission reduction in the South Coast Air Basin by 2010. The proposed ATCM for Para-dichlorobenzene, although being proposed to reduce the exposure of Californians to a Toxic Air Contaminant (TAC), will also result in VOC emission reductions.

2. What product categories are covered under the proposed 2004 Amendments?

The proposed 2004 Amendments will affect 18 consumer product categories. As shown in Table 1 below, these include 14 new categories, including subcategories, for which new product category definitions and VOC limits are proposed, one previously regulated category for which a more restrictive VOC limit is proposed, and two previously regulated categories for which additional requirements are proposed. Not shown in Table 1 is an additional category, Energized Electrical Cleaner, that would be subject to reporting requirements.

Table 1
Product Categories Covered by Proposed 2004 Amendments

New Categories with VOC Limits for Regulation	
Adhesive Remover – 4 subcategories	Footwear or Leather Care Product
Anti-Static Product	Hair Styling Product[1]
Electrical Cleaner	Graffiti Remover
Electronic Cleaner	Shaving Gel
Fabric Refresher	Toilet/Urinal Care Product
	Wood Cleaner
Previously Regulated Category with More Restrictive Limit	
Contact Adhesive[2]	
Previously Regulated Categories with Additional Requirements	
Air Fresheners	General Purpose Degreasers

[1]After 2006, this product category will incorporate Hair Styling Gel and include additional forms of hair styling products (i.e., liquid, semi-solid, and pump spray) but does not include Hair Spray Product or Hair Mousse.
[2]This product category has been separated into 2 subcategories: General Purpose and Special Purpose

3. What are the proposed VOC limits for the 15 categories?

The proposed VOC limits are shown in Table 2. Except for two categories, the effective date is December 31, 2006. Where reformulation is expected to be especially challenging, we are providing additional time in two categories, either December 31, 2008, or December 31, 2009, to comply with limits. Also, note that in the case of Shaving Gel, we are proposing a two-tiered limit to reflect technology and production challenges. Staff also proposes to perform a detailed technical and cost assessment of manufacturers' progress towards meeting the 4 percent VOC limit for Shaving Gel at least one year prior to the effective date of the second-tier limit.

4. What are the emission reduction benefits from the proposed 2004 Amendments?

The statewide VOC emissions reductions from full implementation of the proposed limits for 15 categories is estimated to be about 6.0 tpd in California by December 31, 2006. In the South Coast, the reductions will be about 2.8 tpd. These reductions meet our SIP and lawsuit settlement commitments of 5 tpd statewide by 2006. By 2010 the total expected statewide emission reductions will be about 6.9 tpd.

Table 2 summarizes the staff's proposal and the emission reductions to be achieved. Except for product categories where use of certain TACs will be prohibited, the proposed limits generally represent category VOC emission reductions from about 20 percent to 80 percent. Some of the categories affected by the TAC prohibition, may have slight VOC emission increases. The proposed ATCM for PDCB will also result in an over 95 percent emission reduction. Significant VOC emission reductions, of over 95 percent, from toilet/urinal care products and solid air fresheners will be achieved by

replacement with non-toxic, low-VOC alternative products. Total emissions from the categories proposed for regulation would be 9.5 tpd in 2006. The proposal reduces these emissions by about 65 percent upon full implementation in 2009. Further, the proposal significantly reduces emissions of several TACs. The total TAC reductions will be about 4.9 tpd in 2006 and about 5.1 tpd by 2009 statewide.

Table 2
Proposed VOC Limits and Reductions Achieved

Product Category	Product Form	Proposed VOC Limit (wt%)	VOC Emission Reductions (TPD)[1]	TAC Emission Reductions (TPD)[2]
Adhesive Removers:				
Gasket or Thread Locking Adhesive Remover	All	50	*-0.011*[3]	
Floor or Wall Covering Adhesive Remover	All	5	0.630	*0.99*
General Purpose Adhesive Remover	All	20	0.258	
Specialty Adhesive Remover	All	70	0.138	
Air Freshener[4]	--	--	0.624	*0.624*[7]
Anti-Static Product	Aerosol	80	0.057 (12/31/08)	--
	Non-aerosol	11	0.000	
Contact Adhesive:				
Contact Adhesive - General Purpose	All	55	0.003	*0.007*
Contact Adhesive - Special Purpose	All	80	0.000[5]	
Electrical Cleaner	All	45	0.070	*0.48*[8]
Electronic Cleaner	All	75	0.049	--
Fabric Refresher	Aerosol	15	0.221	--
	Non-aerosol	6	0.220	
Footwear or Leather Care Product	Aerosol	75	0.008	*<0.001*
	Solid	55	0.039	
	All Other Forms	15	0.060	
Graffiti Remover	Aerosol	50	0.014	*0.055*[8]
	Non-aerosol	30	0.071	
Hair Styling Product	Aerosol, Pump Spray	6	0.404	--
	All Other Forms	2	0.163	
Shaving Gel	All	7	0.124	--
		4	0.435 (12/31/09)	
Toilet/Urinal Care Product	Aerosol	10	PD[6]	*2.716*[7]
	Non-aerosol	3	2.709	
Wood Cleaner	Aerosol	17	0.019	--
	Non-aerosol	4	0.232	
		Total Reductions 2006	**6.05**	4.87
		Total Reductions 2008	**6.28**	5.01
		Total Reductions 2009	**6.81**	5.09

1 Survey emissions adjusted for market coverage as discussed in Volume II, Chapter IV; reduction on the effective date of limits which is December 31, 2006, except where otherwise noted.
2 Based on survey emissions; reduction on the effective date of limits which is December 31, 2006.
3 VOC emission increase as result of prohibition on use of certain specified TACs.
4 Currently a regulated category; with elimination of the exemption for 98% para-dichlorobenzene (PDCB) products, additional reductions will be achieved from replacement with lower VOC air fresheners.
5 No reductions; Contact Adhesive was separated into two subcategories and the existing 80% VOC limit was retained for this subcategory.
6 PD = Protected Data; reductions omitted to protect manufacturers' confidential information.
7 PDCB emissions are also included in VOC Emission Reductions.
8 Trichloroethylene emissions are also included in VOC Emission Reductions.

5. What other amendments to the Aerosol Coating Products Regulation, the Antiperspirants and Deodorants Regulation, the Consumer Products Regulation, and test Method 310 are being proposed?

We are proposing to make changes to the most restrictive limit, product date coding, reporting requirements, and sell-through provisions, certain category definitions, test methods, and other minor changes. All of these proposals are designed to improve enforceability of the regulation and ensure that anticipated emission reductions are achieved and maintained.

a. Most Restrictive Limit

The current most restrictive limit provision only applies to representations made on the principal display panel (typically the front label) of the product. Staff proposes that for products manufactured on or after January 1, 2007, category determinations be made based on representations made anywhere on the label, packaging, and all affixed labels or stickers. This proposed language is consistent with a similar provision in the Aerosol Coating Products Regulation.

b. Product Date Coding

Under the current language of the Consumer Products Regulation, products are required to clearly display the date of manufacture or a code indicating the date on all containers. Staff is proposing to require that companies use either the date of manufacture, a specified code, or annually provide an explanation of the code designating the date of manufacture. In addition, an updated explanation would need to be provided any time a code-date is changed. This is proposed such that sell-through products are clearly identified and removed from shelves as appropriate. The options for date coding are included to provide flexibility to the industry. Staff is also proposing that all date codes are public information that may not be claimed as confidential.

c. Reporting Requirements

The proposed amendments would clarify that when information is not submitted by a primary responsible party, any person who holds that information is required to submit it to ARB upon request. This provision ensures complete data are obtained to estimate emissions or set new VOC limits.

d. Sell-through Notification

A written notification provision is proposed that would add a requirement that any person who sells or supplies regulated consumer products during the sell-through period, must notify the purchaser of the product in writing of the date on which the sell-through period for that product will end. However, this notification is required only if the

product is non-compliant and sold or supplied to a distributor or retailer within the last six months of the sell-through period.

e. Definitions

In addition, modifications to several existing definitions are proposed. For example, we have expanded some of the product category definitions to include additional products (e.g., Hair Spray and Hair Styling Product). For other definitions, we are proposing to exclude certain products because those products have been included in their own separate category (e.g., some solid air fresheners are now under the definition of Toilet/Urinal Care Product).

Staff is also proposing to modify the definition of "Deodorant" in section 94501(d), of the Antiperspirants and Deodorants Regulation and propose a new definition in section 94508 of the Consumer Products Regulation for "Deodorant Body Spray." The "Deodorant" definition would be modified to specify that a deodorant is any product that indicates on the label that it can be used under the arm to provide a scent or minimize odor. The proposed definition for "Deodorant Body Sprays" would clarify that these products are personal fragrance products, unless the product label implies it can be used under the arm. Any Deodorant Body Spray label which indicates or depicts that it is suitable for use in the human axilla would be considered a "Deodorant" as defined in section 94501(d). Because the proposed modifications to the Deodorant definition may require some products' labels to be modified, staff is also proposing that the definition would not become effective until January 1, 2006. Staff intends to survey the proposed category "Deodorant Body Spray" to obtain 2003 calendar year formulation and sales data later this year. Staff will use the survey data to determine the most appropriate regulatory strategy. Until such time as an appropriate regulatory strategy is determined, Deodorant Body Sprays will continue to be required to meet a 75 percent by weight VOC limit, equivalent to the limit for "Personal Fragrance Products" containing 20 percent or less by weight fragrance.

f. Test Methods

We are also proposing minor amendments to test Method 310 to include updates to test method citations and dates. Within the Test Methods section of the Aerosol Coating Products Regulation, the Antiperspirants and Deodorants Regulation, and the Consumer Products Regulation, we are proposing to update the date on which Method 310 was last amended. Because Method 310 is proposed for amendment in this rulemaking, within the "Test Method" sections a placeholder for the new effective date for ARB Method 310 is provided. An additional amendment in the Aerosol Coating Products Regulation would update the method whereby acid content in aerosol coatings is determined.

g. Other Minor Changes

Several other minor changes are being proposed that would not substantially affect parties subject to the Regulation, but serve to simplify, clarify, or better organize the Regulation.

6. Will the proposed amendments reduce emissions of Toxic Air Contaminants?

Yes. The proposed regulatory action will also prohibit the use of three TACs, methylene chloride, perchloroethylene, and trichloroethylene in seven categories. The seven categories are Adhesive Removers (including subcategories); Contact Adhesive; General Purpose Degreasers; Electrical Cleaner; Electronic Cleaner; Footwear or Leather Care Product; and Graffiti Remover. However, for safety reasons, the prohibition will not apply to electrical cleaner products used exclusively for cleaning energized equipment. This prohibition will result in TAC emission reductions of about 559 tons per year in 2006. Reductions in VOC TACs are also expected. The proposed action will also prohibit use of a fourth TAC, para-dichlorobenzene.

7. Why are we also proposing an Airborne Toxic Control Measure (ATCM) for Para-dichlorobenzene?

PDCB is a chlorinated benzene compound designated by the International Agency for Research on Cancer to be possibly carcinogenic to humans (Group 2B). It is also a California TAC and a federal Hazardous Air Pollutant (HAP). As such, PDCB has potential carcinogenic and non-cancer health effects. The compound is widely used primarily as an air freshener in toilet and urinal deodorant blocks, as a solid air freshener, and also as the main ingredient in moth balls. Many entities have a policy against the purchase or use of PDCB products in their facilities, including the City of Seattle, Washington; Erie County, New York; the New York Department of Corrections; and the Fire Department of New York City. The state of Vermont has banned its state agencies from purchasing PDCB products. In addition, the New York State Legislature is currently considering a statewide ban on the sale or use of PDCB products in any location open to access by the public.

a. Exposure

As PDCB products are widely used as air fresheners, humans are exposure to PDCB could be substantial. Also, the use of toilet/urinal blocks leads to the ubiquitous presence of PDCB in sewage waters, and surface and ground waters. As wastewater treatment plants aerate sewage in order to promote biodegradation, as well as to strip toxic compounds from the water, the majority of the PDCB that entered the treatment plant is transferred to the air, and may affect communities in the vicinity of the treatment plant. Measurable levels of PDCB are found in breath, blood, urine and even breast milk samples and adipose tissue of most persons sampled.

Outdoor air concentrations of PDCB range from non-detectable in rural areas away from sources to measureable levels outside of homes or in urban areas where air freshener products are used. ARB in 1993, measured atmospheric concentrations of PDCB in the major populations centers of California, with average concentrations of 0.142 parts per billion (ppb). This value is consistent with other measurements done in Los Angeles during 1993 that ranged from nondetectable to 0.349 ppb and in 8 locations around the U.S. with a range of 0.020 to 0.290 ppb.

Indoor air concentrations of PDCB tend to be significantly higher than ambient air concentrations. Because its major uses are for indoor air freshening and as an insect repellant, PDCB is found almost ubiquitously in indoor air. Concentrations of PDCB in a bathroom with one deodorizer block measured by Scuderi, 1986, ranged from 78 ppb to 126 ppb. A bathroom with one urinal deodorizer block and one toilet deodorizer block measured 116 to 220 ppb.

In addition, the Consumer Products Safety Commission in consultation with the U.S. EPA suggests that PDCB products be placed in trunks or other containers that can be stored in areas that are separately ventilated from the home (CPSC Document #450).

b. Regulatory Authority

The California Toxic Air Contaminant Identification and Control Program (program), established under California law by Assembly Bill 1807 (Stats. 1983, Ch. 1047) and set forth in Health and Safety Code (HSC) section 39650-39675, requires the ARB to identify and control TACs in California. Following the identification of a substance as a TAC, HSC Section 39665 requires the ARB, with the participation of the air pollution and air quality management districts and in consultation with affected sources and interested parties, to prepare a report on the need and appropriate degree of regulation for that substance. HSC Section 39665(b) requires that this "needs assessment" address, among other things, the technological feasibility of proposed ATCMs and the availability, suitability, and relative efficacy of substitute products or processes of a less hazardous nature. Once the ARB has evaluated the need and appropriate degree of regulation for a TAC, HSC Section 39666 requires the ARB to adopt regulations to reduce emissions of the TAC. For a TAC where the ARB has not specified a threshold exposure level below which no significant adverse health effects are anticipated, HSC section 39666(c) requires that the ATCM be designed to reduce emissions to the lowest level achievable through the application of best available control technology or a more effective control method. Cost; health risk; substitutes; environmental impacts; and other specified factors must be taken into account when designing the control measure.

Staff is not proposing to ban PDCB use in mothballs. The Department of Pesticide Regulation (DPR), a part of the California Environmental Protection Agency, registers PDCB use as a pesticide for control of clothes moths. ARB does not have

regulatory authority, under HSC Sections 39650-39675, to control registered pesticides and therefore, we are not addressing this use of PDCB in moth balls.

Proposed Requirements

The proposed ATCM will ban the use of PDCB in toilet/urinal blocks and solid air fresheners. Under the proposal, effective December 31, 2006, no person shall sell, supply, offer for sale, or manufacture for use in California any solid air fresheners or toilet/urinal care products that contain PDCB. Solid air fresheners or toilet/urinal care products that contain PDCB that were manufactured prior to December 31, 2006, may be sold, supplied, or offered for sale until December 31, 2007, so long as the product clearly displays the date on which the product was manufactured, or a code indicating such date. A one year sell through is proposed rather than a longer time frame, in order to reduce public exposure as soon as possible. A number of viable alternatives to PDCB toilet/urinal blocks have been brought to the market. There are also complying solid air fresheners available that do not contain PDCB.

c. Emission Reductions and Environmental Impacts

There are environmental benefits of the proposed ATCM. The first benefit is that emission reductions of 1,219 tons per year of PDCB in 2006 would be achieved. The second benefit will be a reduction in public exposure to PDCB. The risk assessment analysis that we conducted for a generic wastewater treatment plant estimated that the highest potential cancer impact, of approximately 9 per million persons , was found 20 meters downwind from the perimeter of the dechlorination process area. The best case effect on exposure, because of the ATCM, is a reduction in potential cancer risk of 9 excess cases per million people from outdoor exposure and potential cancer risk of 145 excess cancer cases per million from indoor exposure. The complete analysis is found in Chapter VII.

d. Cost

The PDCB blocks generally cost less than their non-PDCB counterparts, as little as half as much, but substantial overlap in price was seen, especially when the blocks were sold contained within a urinal screen. A review of online retailers reveal a typical PDCB 12 pack of four ounce blocks, each which will last for 30 days, with prices in the $5 to $8 range. Comparable prices for the non-PDCB block, albeit with screen included, average $17 for a 12 pack with each individual block also lasting for about 30 days.

Rim hanging blocks showed similar price differentials, with a PDCB 12 pack selling for about $9 and a non-PDCB 12 pack selling for about $18. The price for non-PDCB blocks, though, is not always higher, with some manufacturers selling PDCB blocks saturated with an alternate fragrance, such as cherry, and contained within a screen, in the $20 range for a 12 pack. Enzyme-containing non-PDCB blocks tend to be the most expensive, with prices running in the $25 range for a 12 pack. As a result

of the proposed ban on PDCB in solid air fresheners and toilet/urinal care products, producers of PDCB (no California producers) may see an overall reduction in sales of as high as three percent. However, most manufacturers and distributors of PDCB products also provide the alternatives, so as a result, they should not be significantly impacted.

e. Availability of Alternatives and Technological Feasibility of the ATCM

The proposed ATCM would prohibit the use of PDCB in solid air fresheners and toilet/urinal care products. Compliance with the proposal will not be difficult. Numerous non-PDCB toilet/urinal care products are already available and well accepted by consumers.

As with the toilet/urinal care products, there are many non-PDCB air fresheners available. The traditional room air fresheners that are available are fragrance pearls and potpourri. There are also solid/gel room air fresheners available at stores for general consumers and for janitorial supplies.

8. Who would be affected by these proposed amendments?

The proposed 2004 Amendments would apply to anyone who sells, supplies, offers for sale, or manufactures consumer products for use in the state of California that are subject to the proposed amendments. The primary impact would be on manufacturers and marketers of consumer products, which will have to reformulate some of their products. There may also be an impact on distributors and retailers, who must ensure that they are selling or supplying complying products. In addition, since some products will have to be reformulated, suppliers of chemicals, propellants, containers, valves, and other components may be impacted, depending on whether there is an increased or decreased demand for their products. Finally, consumers may have to pay more for some consumer products, or may have to make some adjustments to their use of the reformulated products.

9. Will the provisions in the existing Consumer Products Regulation apply to the product categories?

Yes. The existing provisions in the Consumer Products Regulation (such as the low vapor pressure VOC exemption, innovative products provision, and variance provision) will apply to the categories proposed for regulation.

10. Will the Alternative Control Plan (ACP) be available to the proposed product categories?

Yes. The ACP will allow manufacturers to submit plans to "average" the emissions from any combination of consumer products subject to the VOC limits in section 94509 of the Consumer Products Regulation, including the proposed new product categories. However, manufacturers cannot submit plans which include both

consumer products, subject to section 94509 "Innovative Products Provision," or aerosol coating products (aerosol paints) subject to section 94522.

D. REGULATORY DEVELOPMENT PROCESS AND EVALUATION OF ALTERNATIVES

1. How did ARB staff develop the Proposed 2004 Amendments?

In 2002, a subcommittee of the Consumer Products Working Group, the Consumer Products Regulation Workgroup (CPRWG) was formed to serve as a forum for communication during the survey and 2004 Amendments development process. Participation was open to any member of the public.

ARB staff began the process to develop the 2004 Amendments with a comprehensive survey of select categories of consumer products, the "2001 Consumer and Commercial Products Survey" (2001 Survey). Numerous meetings were held with the CPRWG while developing the 2001 survey.

This survey collected sales and formulation information on about 48 different consumer product categories and provided ARB staff with technical information that was used to develop the proposed 2004 Amendments. Four public meetings of the CPRWG were conducted from March 2003 through March 2004 while developing the 2004 Amendments. During the first workgroup meeting, we discussed the results of the 2001 Survey, and discussed an initial prioritization of consumer product categories for regulation development. At the next three workgroup meetings, staff discussed various regulatory proposals. On March 11, 2004, ARB held a public workshop for the 2004 Amendments. A chronology of the meetings and public workshop held is shown in Table 3.

To solicit additional information and comments, staff held or participated in numerous individual meetings, teleconferences, and video conferences with industry representatives. Staff also analyzed survey data, performed shelf surveys, and researched technical literature, patents, and trade journals during the development of the proposed amendments.

Table 3
Chronology of Public Meetings and Workshops

Date	Meeting	Location
March 11, 2003	1st Public Workgroup Meeting for the CPRWG	Sacramento, CA with teleconference available
October 21, 2003	2nd Public Workgroup Meeting for the CPRWG	Sacramento, CA with teleconference available
December 16, 2003	3rd Public Workgroup Meeting for the CPRWG	Sacramento, CA with teleconference available
March 10, 2004	4th Public Workgroup Meeting for the CPRWG	Sacramento, CA with teleconference available
March 11, 2004	Public Workshop on the proposed amendments	Sacramento, CA with videoconference available

2. Who has actively participated in the process?

Consumer product manufacturers, chemical producers, and marketers, and their trade associations, have been the most active in the process. The trade associations include the following:

- Consumer Specialty Products Association
- Cosmetic, Toiletry, and Fragrance Association
- National Paint and Coatings Association
- Adhesives and Sealants Council
- Chlorobenzene Producers Association
- American Beauty Association
- International Sanitary Supply Association
- Automotive Specialty Products Association
- Soap and Detergent Association
- Automotive Aftermarket Industry Association
- American Pet Products Manufacturers

In addition, representatives from local air districts and agencies, including the South Coast Air Quality Management District and the Los Angeles County Sanitation District, and U.S. EPA as well as many other individual consumer product manufacturers were involved in the process.

ARB staff maintains a mailing list of over 3,000 companies and interested parties, including environmental organizations, which received information throughout the development of the proposed amendments. In addition, we have established an electronic list serve to allow subscribers to receive pertinent information with over 650 subscribers.

3. How did ARB staff evaluate alternatives and choose the product categories proposed for regulation?

ARB staff began the selection process by reviewing all the consumer product categories included in the 2001 Survey, including both unregulated categories and previously regulated categories. Staff then eliminated from consideration: (1) categories where very little or no potential for emission reductions existed, (2) categories where adequate data were not obtained for pursuing emission reductions, and (3) categories where the technical justification for setting new VOC limits could not be completed in the required timeframe. The remaining 20 categories were proposed for regulation at the first public workgroup meeting.

At the second, third, and fourth public workgroup meetings, staff presented regulatory proposals for discussion. After each workgroup meeting, staff modified the proposals, as appropriate, based on the comments and technical information received from industry and staff investigations. During this process, several categories were postponed for consideration for the reasons given above. As mentioned previously, the current proposal would affect 18 categories, including 14 new categories, including subcategories, for which new product category definitions and VOC limits are proposed; one previously regulated category for which a more restrictive VOC limit is proposed; two previously regulated categories for which additional requirements are proposed; and an additional category, Energized Electrical Cleaner, that would be subject to reporting requirements.

4. How were the proposed VOC limits in the proposed 2004 Amendments established?

The proposed VOC limits are the product of extensive research and analysis of data by staff and interaction with the affected consumer products industry, as discussed in the response to question number three. Although the proposed limits were based on factors unique to each individual category, the following general guiding principles were applied:

- technological and commercial feasibility - assuring that reformulation technologies will be available by the effective date for each proposed limit and that the basic consumer market demand can be met on that date;

- emission reductions achieved - assuring that our overall proposal will achieve the maximum feasible reduction as required by state law;

- preservation of product forms - assuring that each existing product form (e.g. liquid, semi-solid, solid, aerosol) is able to reformulate to meet the proposed VOC limit; and,

- minimize potential for use of Toxic Air Contaminants - assuring that the proposed limit can be met with formulations that do not rely on the increased use of Toxic Air Contaminants.

E. COMPLIANCE WITH THE PROPOSED 2004 AMENDMENTS

1. How will manufacturers comply with the proposed 2004 Amendments?

Manufacturers of non-complying products will need to reformulate their products to meet the applicable VOC limits. Manufacturers have the flexibility to choose any formulation that meets the applicable VOC limits, and the reformulation options vary with each product category (see Chapter VI of the Technical Support Document). In general, VOC solvents or propellants will need to be replaced, or partially replaced, with non-VOC ingredients. This may require switching to a water-based formulation using acetone or another exempt solvent, increasing product solids, or formulating with a non-VOC propellant. Manufacturers may also need to change the valve, container, delivery system, or the other components of the consumer product depending on the individual formulation. ARB staff has proposed VOC limits that can be met without the increased use of TACs.

2. Are there alternative compliance options to the proposed VOC limits?

Yes. Manufacturers can comply with the proposed amendments through the use of the Innovative Products Provision (IPP), or the Alternative Control Plan (ACP). The IPP allows manufacturers of "innovative products" to comply with the Consumer Products Regulation if they demonstrate through clear and convincing evidence that their product will result in less VOC emissions than a complying product that meets the applicable VOC limit. The innovative product may result in less emissions due to some characteristic of the product formulation, design, delivery system, or other factors.

The ACP allows manufacturers to average the emissions from products above and below the applicable VOC limits, as long as the overall emissions are less than or equal to the emissions that would have occurred had all the products complied with the VOC limits. Manufacturers must submit an application which includes the VOC content of the products in the plan, a method of verifying the sales of each product in the plan, and other information necessary to track overall emissions.

3. Are the VOC limits for the proposed amendments technologically and commercially feasible?

As explained in detail in Chapters III and VI of the Technical Support Document, all the VOC limits proposed are technologically and commercially feasible. The proposed limits were targeted towards the lowest VOC content technology within a product category which would adequately perform the intended function. In doing this,

we ensured that the various product forms within each category would be preserved, and the proposed limits could be met without the use of TACs. ARB staff will track manufacturers' progress in meeting the proposed VOC limits, as we have done in past regulatory efforts for consumer products. If manufacturers encounter unanticipated but insurmountable difficulties, we will consider proposing amendments to the Consumer Products Regulation to address them.

As shown in Table 4, our survey results demonstrate that products are available that comply with the proposed limits for most of the product categories. While there are no complying products currently available in the market place for Gasket or Thread Locking Adhesive Remover, Aerosol Graffiti Remover, Aerosol Hair Styling Product, Pump Spray Toilet/Urinal Care Product and Aerosol Wood Cleaners, lower emission technology exists for achieving the proposed weight percent VOC limits. The complying market shares listed in Table 4 vary widely with each category (as in previous regulations) because the proposed limits were developed after considering a variety of factors unique to each category. These factors include the availability of reformulation options that may not be used in current products, the variety of product types in a given category, patents that may restrict some reformulation options, and economic issues.

Also note that we are providing until December 31, 2006, to allow time for reformulation in all categories, except Aerosol Anti-static Product and the second-tier limit for Shaving Gel (see Table 2 of this Executive Summary). To comply with challenging VOC limits, the Aerosol Anti-static Product category will be given until December 31, 2008, and Shaving Gel products will be given until December 31, 2009. In addition, staff will also perform a detailed technical assessment of manufacturers progress in meeting the 4 percent VOC limit for Shaving Gels at least one year prior to the effective date of the second-tier limit.

Table 4
Summary of Complying Products

Product Category	Product Form	Proposed VOC Limit (wt%)	Number of Complying Products/ Total	Complying Market Share (%)[1]
Adhesive Removers:				
Gasket or Thread Locking Adhesive Remover	All	50	0/15	0
Floor or Wall Covering Adhesive Remover	All	5	9/28	42
General Purpose Adhesive Remover	All	20	4/43	11
Specialty Adhesive Remover	All	70	3/19	6
Air Freshener[2]	–	–		
Anti-Static Product	Aerosol	80	3/8	2
	Non-aerosol	11	13/13	100
Contact Adhesive:				
Contact Adhesive - General Purpose	All	55	5/13	80
Contact Adhesive - Special Purpose	All	80	12/12	100
Electrical Cleaner	All	45	22/88	7
Electronic Cleaner	All	75	47/106	52
Fabric Refresher	Aerosol	15	2/16	1
	Non-aerosol	6	47/61	97
Footwear or Leather Care Product	Aerosol	75	11/17	82
	Solid	55	19/25	39
	All Other Forms	15	113/162	87
Graffiti Remover	Aerosol	50	0/35	0
	Non-aerosol	30	4/30	11
Hair Styling Product	Aerosol	6	PD/1	PD
	Liquid	2	81/113	57
	Pump Spray	6	92/126	62
	Semi-solid	2	348/390	97
	Solid	2	61/99	99
Shaving Gel	All	7	15/27	34
		4	1/27	0
Toilet/Urinal Care Product	Aerosol	10	PD/1	PD
	Foam	3	PD/2	PD
	Gel	3	PD/2	PD
	Liquid	3	123/141	98
	Pump Spray	3	PD/2	PD
	Solid	3	73/116	59
	Other	3	2/2	100
Wood Cleaner	Aerosol	17	0/4	0
	Non-aerosol	4	32/40	90

PD = Protected Data; data omitted to protect manufacturers' confidential information.
[1] Complying market share is based on sales rather than number of products.
[2] We are not proposing a new limit for the category.

F. ECONOMIC IMPACTS

1. Will the proposed amendments be cost-effective?

Cost-effectiveness is one measure of a regulation's efficiency in reducing a given amount of pollutant (often reported in "dollars (to be) spent per pound of pollutant reduced"). The determination of cost-effectiveness is well-established and often used to compare a proposed regulation's cost-efficiency with those of other regulations. To determine the cost-effectiveness of the proposed regulation, we relied on specific formulation data from the "2001 Consumer and Commercial Products Survey," industry journals/literature such as the Chemical Market Reporter for ingredient unit prices, discussions with industry representatives, and the cost analyses conducted for the existing ARB consumer products program. Based on our analyses, we estimate the cost-effectiveness of the proposed VOC limits is about $2.00 per pound of VOC reduced. This estimated cost-effectiveness value is consistent with existing ARB regulations and control measures. For example, for the 1997 Hairspray Regulation, and the 1995 Aerosol Coating Products Regulation the cost-effectiveness was about $2.25 and $3.00 per pound of VOC reduced, respectively. Further, the cost-effectiveness of the recent Inboard Marine and Transit Bus Measures were each determined to be approximately $2.00 per pound of ozone precursor reduced. In our proposal we have included a second tier limit of 4 percent VOC for Shaving Gel effective December 31, 2009. This second tier limit would increase the overall cost effectiveness of the regulation to about $2.40 per pound of VOC reduced. Because staff believes that the second tier limit is challenging, and may require significant effort for industry to comply, we commit to perform a detailed technical assessment of the proposed limit at least one year prior to the December 31, 2009, effective date. Based on the results of the technical assessment, staff may consider modifying the second tier proposal.

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. These cost estimates are based on assumptions specific to each category depending on reformulation needs. 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.

2. Will consumers have to pay more for consumer products subject to the 2004 Amendments?

Consumers may have to pay more for some products subject to the proposed amendments, depending on the extent to which manufacturers are able to pass along their costs to consumers. As explained in Chapter VIII of the Technical Support Document, the average increase in cost per unit to the manufacturer is estimated to be about $0.16. These estimated cost per unit values are consistent with existing ARB regulations and control measures. For example, for the 1989 Antiperspirants and

Deodorants Regulation, and the 1995 Aerosol Coatings Products Regulation, the increased cost to manufacturers were about $0.25 and $0.30 respectively.

3. What are the expected economic impacts of the proposed regulation on businesses?

In our economic impacts analysis, we evaluated the proposed VOC limits for potential impacts on profitability and other aspects of businesses subject to the limits (with particular attention to California businesses), the cost-effectiveness of the limits, and the estimated cost impacts to consumers. To conduct our analysis, we relied on a combination of publicly available financial databases *(Dun and Bradstreet, Ward's Business Directory of U.S. Manufacturing Industries*), the ARB's 2001 Consumer and Commercial Products Survey, industry journals/literature such as the *Chemical Market Reporter*, discussions with industry representatives, and the cost analyses conducted for the existing ARB consumer products program.

Based on our analysis, we expect most manufacturers to be able to absorb the added costs of the proposed regulation without an adverse impact on their profitability. In addition, as explained in more detail below, we found that the proposed amendments are cost-effective relative to similar ARB regulations or measures, and the impacts to consumers are consistent with existing ARB regulations.

We estimated the change in "return-on-owners equity" (ROE) as an indicator of the limits' potential impacts on business profitability. The cost to comply with the proposed regulation, through increased research and development, equipment purchase and other investment costs, is presumed to impact a business' ROE and therefore its profitability. The cost to reformulate non-complying products for a typical company was used to determine total annual reformulation costs. Our analysis indicates the estimated change in ROE can vary from essentially no change to 6.9 percent change. The average change in ROE is about 0.7 percent, relative to the ROE before the proposed amendments would take effect. This estimated change in ROE is well within the change in ROE estimated for ARB's existing consumer products and motor vehicle programs.

Our ROE analysis for the proposed limits may overestimate the impact on business because it assumes that all of the costs of the proposed limits will be absorbed by manufacturers. In reality, we expect that at least some of the investment costs to comply with the proposed limits will be passed on to consumers. The analysis also does not quantify the extent of cost mitigation due to "technology-transfer" between product lines and from third-party manufacturers (i.e., contract fillers) who fill essentially equivalent products for a number of competing businesses.

While we expect that most businesses will be able to absorb the costs of the proposed amendments without significant adverse impacts on their profitability, there is the possibility that some individual businesses will be adversely affected by this regulatory action. Therefore, it is possible that the proposed amendments may have a

significant adverse impact on some businesses that are not in a market position to invest monies to develop new low VOC products, or to absorb the increased cost resulting from their compliance with the proposed regulation.

Based on our analysis, we do not expect the proposed amendments to have a significant impact on employment, or business creation, elimination, or expansion. We also do not expect the regulation to have a significant impact on the competitiveness of California businesses compared with those outside of California. This is because all companies that sell these products in California would have to meet the proposed requirements, whether located in California or outside of California.

The VOC limits in the proposed amendments will primarily impact consumer product manufacturers and marketers (companies which contract out the manufacturing of their products). However, we recognize that other industries could also be impacted to a lesser amount which is difficult to quantify. These industries include distributors, retailers, and "upstream" suppliers who supply containers, valves, solvents, propellants, and other chemicals used in consumer products.

Distributors and retailers could be impacted if some manufacturers decide to carry a dual inventory of products (one for California and one for the rest of the nation). However, most manufacturers have indicated that they will not manufacture California and 49-state products because dual-distribution systems are expensive to establish and maintain. Another potential cost to distributors or retailers would be the implementation of procedures to ensure that non-complying products are not sold past the three year "sell-through period." However, based on retail sell-through data obtained during the development of ARB's existing consumer products regulations, we believe the existing three year sell-through period should provide ample time to allow for the sale of non-complying products.

Upstream suppliers could be impacted because manufacturers will be purchasing some different solvents, propellants, and other materials for their reformulated products. They may also purchase different containers, valves, or other components for their reformulated products. However, we do not expect these changes to result in a major impact on the affected industries because chemical companies generally supply many different industries, and because many of the upstream suppliers also provide the alternative products which will be used in the reformulated products. In fact, we expect some upstream suppliers will benefit since the proposed limits are likely to create new or increased demand for materials to be used in compliant formulations.

G. ENVIRONMENTAL IMPACTS

1. What are the expected environmental benefits of reducing VOCs in the 2004 Amendments?

One of the environmental benefits of the 2004 Amendments will be a reduction in the formation of ground level ozone because the proposed VOC limits result in

reductions of ozone precursors (VOC) of 6.8 tpd statewide by December 31, 2009, based on the 2001 survey results. We also expect no adverse impact and most likely a positive impact on secondary organic aerosol formation. VOCs are a source of particulate matter (PM), namely secondary organic aerosols, either through condensation of the VOCs or complex reactions of VOCs with other compounds in the atmosphere. In general, depending on reformulation options chosen, secondary organic aerosols will be reduced.

2. Will Toxic Air Contaminants be reduced?

Another benefit of these amendments would be a reduction in TACs emissions of 1,778 tons per year in 2006. Due to the prohibition of use of methylene chloride, perchloroethylene, and trichloroethylene in seven categories, we estimate that there will be a reduction of 559 tons per year of these TACs. Para-dichlorobenzene emissions will be reduced by 1,219 tons per year in 2006 as the result of this rulemaking.

3. Will this proposal reduce the cancer health risk?

Yes. Staff estimates that in the seven categories where staff proposes prohibitions of methylene chloride, perchloroethylene, and trichloroethylene, for a given category, up to 64 chances of potential excess cancer cases per million persons would be avoided statewide. As for para-dichlorobenzene, we estimate that 9 potential excess cancers per million persons would be avoided statewide. These estimates are based on outdoor, near-source, exposure over a 70 year lifetime. Further, for reductions of para-dichlorobenzene, we estimate that there would be 145 potential excess cancer cases per million avoided as a result of indoor exposure.

4. How would the 2004 Amendments proposal reduce the risk to public health by reducing VOCs?

While we cannot accurately assess potential risk reduction due to reducing VOC and PM emissions, it has long been known that exposure to ground level ozone and PM have adverse impacts on public health. Research has shown that, when inhaled, ozone and PM can cause respiratory problems, aggravate asthma, and impair the immune system. Any reduction in PM or ozone precursors, namely VOCs, results in improving health in California.

5. Are there any potential negative environmental impacts?

We examined the potential effect of the proposed regulation on global warming, stratospheric ozone depletion, the use of TACs, and the impacts on water quality and solid waste disposal. Based on our analysis, as detailed in Chapter IX of the Technical Support Document, we do not expect any significant adverse environmental impacts to result from the proposed 2004 Amendments. Staff does acknowledge a slight erosion of VOC emissions reductions due to the prohibition of methylene chloride, perchloroethylene, and trichloroethylene. Also there is a possibility of a slight increase

in global warming potential of certain aerosol products if hydrofluorocarbon (HFC) 152a is used as a reformulation option.

6. How does the proposal relate to ARB's goals on environmental justice?

This proposal is consistent with the ARB's Environmental Justice Policy to reduce health risks in all communities, including low-income and minority communities. Generally, use of consumer products is fairly uniform across the State, tracking with housing units, and their emissions are spread over the course of a day, rather than concentrated at a particular time of day. For these reasons, we do not believe that people of any given race, culture, or income would be more impacted than any others would. All Californians should benefit equally from the reduction in VOC emissions from the consumer product categories proposed for regulation, as well as from the prohibition on use of chlorinated solvents that are TACs in the categories containing them.

Because the proposed limits for toilet/urinal care products effectively prohibit the use of PDCB, we would expect to nearly eliminate PDCB from waste water influent and effluent levels. As a result, PDCB concentrations in the air near Publicly Owned Treatment Works (POTWs) will be reduced. The lowering of PDCB levels in effluents from POTWs across the state would provide an environmental benefit to the communities where they are located.

H. FUTURE PLANS

During the summer of 2004, staff will begin developing the 2003 Consumer and Commercial Products Survey (2003 Survey). The 2003 Survey will be comprehensive in nature and will be used as the basis for upcoming rulemakings in 2005 and 2006. In addition, staff has committed to another survey in 2006 for the 2005 sales year, which will be used as the basis for another rulemaking in 2008. For each of these future activities staff will consult with interested parties through the same workgroup process (see Chapter II) used to develop the 2004 Amendments.

I. RECOMMENDATION

We recommend that the Board adopt the proposed 2004 Amendments to the three Consumer Products Regulations, the ATCM for para-dichlorobenzene, and the revisions to test Method 310.

REFERENCES

Consumer Products Safety Commision and Environmental Protection Agency, The Guide to Indoor Air Quality, CSPC Document #450. http://www.cpsc.gov/cpscpub/pubs/450.html (CSPC Document #450)

Settlement Agreement, with amendments, in *Coalition for Clean Air, Inc. et al. v. South Coast Air Quality Management District, et al.* (U.S. District Court, Central District of CA, Case No. CV-97-6916 JSL (SHx))

State of California
AIR RESOURCES BOARD

Initial Statement of Reasons for Proposed Amendments to the California Aerosol Coating Products, Antiperspirants and Deodorants, and Consumer Products Regulations, Test Method 310, and Airborne Toxic Control Measure for Para-dichlorobenzene Solid Air Fresheners and Toilet/Urinal Care Products

Volume II:
Technical Support Document

I.

INTRODUCTION

A. OVERVIEW

In Volume II of the Initial Statement of Reasons (ISOR) for Proposed Amendments to the California Aerosol Coating Products, Antiperspirants and Deodorants, and Consumer Products Regulations, Test Method 310, and Airborne Toxic Control Measure (ATCM) for Para-dichlorobenzene Solid Air Fresheners and Toilet/Urinal Care Products, we present our technical justification and analysis of the proposed 2004 Amendments to the consumer products regulations. The proposed 2004 Amendments (Appendix A) are intended to fulfill the CONS-1 commitment of the consumer products element in the State Implementation Plan (SIP), and fulfill the requirements of a SIP lawsuit settlement agreement reached with environmental groups.

Included in this technical support document is the following information:

- a discussion of the process used to develop the proposed amendments;
- a discussion of the technical basis for the proposed amendments;
- a review of the emissions from the proposed categories for regulation and the overall need for the emission reductions;
- a description of the proposed amendments and the consumer product categories proposed for regulation;
- an assessment of the need for an ATCM to control emissions of para-dichlorobenzene from consumer products;
- an analysis of the environmental and expected economic impacts from the proposed amendments; and
- a discussion of future activities.

B. ENABLING LEGISLATION

In 1988, the California Clean Air Act (CCAA or "the Act) became law to address the State's serious air pollution problems and the inability of many areas in California to attain the state and federal ambient air quality standards. The CCAA added section 41712 to the California Health and Safety Code (HSC) which, along with subsequent amendments, requires the Board to adopt regulations to achieve the maximum feasible

reduction in volatile organic compound (VOC) emissions from consumer products, if the Board determines that adequate data exist to establish both of the following:

- The regulations are necessary to attain state and federal ambient air quality standards; and

- the regulations are commercially and technologically feasible.

The Act further stipulates that regulations adopted must not eliminate any product form, and that recommendations from health professionals must be considered when developing VOC control measures for health benefit products. In enacting section 41712, the Legislature gave the ARB authority to control emissions from a very diverse number of products sold statewide to household and commercial consumers.

In addition, the ARB was given authority to develop control measures under the California Toxic Air Contaminant Identification and Control Program. The California Toxic Air Contaminant (TAC) Identification and Control Program (Program), established under California law by Assembly Bill 1807 (Stats. 1983, Ch. 1047) and set forth in HSC sections 39650-39675, requires the ARB to identify and control air toxicants in California. In the federal Clean Air Act Amendments of 1990, the United States Environmental Protection Agency (U.S. EPA) identified PDCB as a hazardous air pollutant (HAP) because evidence indicated the substance may have adverse effects on human health or the environment. In accordance with HSC section 39650(b), which requires the Board to designate federal HAPs as TACs, the Board identified PDCB as a TAC in 1993.

Following the identification of a substance as a TAC, HSC section 39665 requires ARB, with participation of the air pollution control and air quality management districts and in consultation with affected sources and interested parties, to prepare a report on the need and appropriate degree of regulation for that substance. HSC section 39665(b) requires that this "needs assessment" address, among other things, the technological feasibility of proposed ATCMs and the availability, suitability, and relative efficacy of substitute products or processes of a less hazardous nature.

Once ARB has evaluated the need and appropriate degree of regulation for a TAC, HSC section 39666 requires ARB to adopt regulations (ATCMs) to reduce emissions of the TAC. For a TAC where there is no threshold exposure level below which no significant adverse health effects are specified, HSC section 39666 (c) requires that the ATCM be designed to reduce emissions to the lowest level achievable through the application of best available control technology or a more effective control method. Cost, health risk, environmental impacts, and other specified factors must be taken into account when designing the control measure.

C. BACKGROUND

1. Consumer Product Regulations Adopted to Date

To date, the Board has taken several actions to fulfill the legislative mandate pertaining to the regulation of consumer products. Three regulations have been adopted setting limits for a total of 47 consumer product categories and 36 categories of aerosol coatings. In addition, two voluntary regulations (Article 4, sections 94540-94555, the Alternative Control Plan and Article 5, sections 94560-94575, the Hairspray Credit Program) have been adopted to provide compliance flexibility to companies. A complete summary of the regulation adopted and dates of regulatory amendments are provided in Appendix B.

2. Air Toxics Control Measures Adopted to Date

Once the ARB has evaluated the need and appropriate degree of regulation for a Toxic Air Contaminant (TAC), State law (HSC section 39666) requires the ARB to adopt regulations to reduce emissions of the TAC to the maximum extent feasible in consideration of cost, risk, and other factors specified in HSC section 39665. To date, the ARB has developed 19 ATCMs. A list of the ATCMs is provided in Table I-1.

Table I-1
List of Current Airborne Toxic Control Measures

CCR Number	Title of ATCM	Date of Adoption
17 CCR 93101	Benzene ATCM for Retail Service Stations	May 13, 1988
17 CCR 93102	Hexavalent Chromium ATCM for Decorative and Hard Chrome Plating and Chromic Acid Anodizing Facilities	February 18, 1988 *amended:* May 21, 1998
17 CCR 93103	Chromate Treated Cooling Towers	March 9, 1989
17 CCR 93104	Dioxins ATCM for Medical Waste Incinerators	July 13, 1990
17 CCR 93105	Abestos ATCM for Construction, Grading, Quarrying, and Surface Mining Operations	July 26, 2001
17 CCR 93106	Asbestos ATCM for Surfacing Applications	July 20, 1990 *amended:* July 20, 2000
17 CCR 93107	ATCM for Emissions of Toxic Metals from Non-ferrous Metal Melting	January 14, 1993
17 CCR 93108 17 CCR 93108.5	Ethylene Oxide ATCM for Sterilizers and Aerators: Parts 1 and 2	May 21, 1998 *effective:* January 28, 1999
17 CCR 93109	ATCM for Emissions of Perchloroethylene from Dry Cleaning Operations	October 14, 1993

17 CCR 93110	Environmental Training Program Regulation for Perchloroethylene Dry Cleaning Operations	October 14, 1993
17 CCR 93111	ATCM for Emissions of Chlorinated Toxic Air Contaminants from Automotive Maintenance and Repair Activities	April 27, 2000
17 CCR 93112	ATCM for Emissions of Hexavalent Chromium and Cadmium from Motor Vehicle and Mobile Equipment Coatings	September 20, 2001
17 CCR 93113	ATCM to Reduce Emissions of Toxic Air Contaminants from Outdoor Residential Waste Burning	February 2, 2003
13 CCR Chapter 10, Article 1, Section 2480	ATCM to Limit School Bus Idling and Idling at Schools	December 12, 2002
17 CCR 93114	ATCM for non-vehicular diesel engines	July 24, 2003*
13 CCR 2020, 2021, 2021.1, 2021.2	ATCM for on-road heavy-duty residential and commercial solid waste collection vehicles	September 25, 2003*
17 CCR 93115	Airborne Toxic Control Measure for Stationary Compression Ignition Engines	February 26, 2004*
13 CCR Chapter 3, Division 3, Article 4, Section 2022	ATCM for in-use diesel-fueled transportation refrigeration units (TRU) and TRU generator sets, and facilities where TRUs operate	February 26, 2004*
17 CCR 93116, 93116.1, 93116.2, 93116.3, 93116.4, and 93116.5	ATCM for portable diesel-fueled engines	February 26, 2004*

* Indicates an ATCM that is not yet approved by the Office of Administrative Law

3. Consumer Products and the State Implementation Plan

2003 State and Federal Strategy and 2003 South Coast SIP

On October 23, 2003, the ARB adopted *the Proposed 2003 State and Federal Strategy for the California State Implementation Plan* (Statewide Strategy, 2003) which reaffirms the ARB's commitment to achieve the health-based air quality standards through specific near-term actions and the development of additional longer-term strategies. The Statewide Strategy identifies the Board's near-term regulatory agenda

to reduce ozone and particulate matter by establishing enforceable targets to develop and adopt new measures for each year from 2003 to 2006, including commitments for the Board to consider 19 specific measures. It also sets into motion a concurrent initiative to identify longer-term solutions to achieve the full scope of emission reductions needed to meet federal air quality standards in the South Coast and San Joaquin Valley by 2010. In addition to meeting federal requirements, this Strategy ensures continued progress towards California's own health-based standards.

The ARB and local air districts are in the process of updating the California SIP to show how each region in the state will meet the federal air quality standards. The measures outlined in the adopted Statewide Strategy are being incorporated into these SIP revisions. The South Coast's 2003 Air Quality Management Plan (SCAQMD, 2003) was adopted by the South Coast Air Quality Management District Governing Board on August 1, 2003. The ARB approved the local SIP element on October 23, 2003, and on January 9, 2004, the ARB submitted to the U.S. EPA both the Statewide Strategy and the 2003 South Coast SIP as revisions to the California SIP. The new SIP updates all elements of the approved 1994 SIP and includes additional consumer products measures. Upon approval by U.S. EPA, the 2003 SIP will replace the State's commitments in the 1994 SIP. The ARB is currently working with the San Joaquin Valley Unified Air Pollution Control District on a revision to the San Joaquin Valley's ozone SIP. The revised San Joaquin Valley SIP is scheduled for consideration by the District's Governing Board and by the ARB later this year.

Together with significant reductions from stationary industrial facilities, mobile sources, and other areawide sources, the reductions in the consumer products element of the SIP are an essential part of California's effort to attain the air quality standards. The following two measures from the Statewide Strategy and the 2003 South Coast SIP are intended to reduce emissions from consumer products:

- **Measure CONS-1: Set New Consumer Products Limits for 2006.** The ARB committed to develop a measure to be proposed to the Board between 2003 and 2004, and implemented by 2006, that would achieve VOC emission reductions from consumer products of at least 2.3 tons per day (tpd) in the South Coast Air Basin in 2010. Statewide, this measure would achieve 5.3 tpd in emission reductions by 2010.

- **Measure CONS-2: Set New Consumer Products Limits for 2008-2010.** The ARB committed to develop new consumer product category limits to be proposed to the Board between 2006 and 2008, with implementation in 2008 and 2010, that would achieve VOC emission reductions from consumer products of between 8.5 tpd and 15 tpd in the South Coast Air Basin in 2010. Statewide, this measure would achieve 20-35 tpd in emission reductions by 2010.

- **Further Reductions from Consumer Products.** In addition, it is expected that further emission reductions will be needed from all source categories, including

consumer products, to meet the long-term emission reduction targets included in the South Coast SIP.

The amendments to the consumer products regulation proposed in this document are intended to fulfill the commitment for SIP measure CONS-1.

4. SIP Lawsuit Settlement Agreement

In 1997, three environmental groups (Communities for a Better Environment, the Coalition for Clean Air, and the Natural Resources Defense Council) filed a complaint in the United States District Court for the Central District of California. The lawsuit was filed against the ARB, the South Coast Air Quality Management District, and the U.S. EPA related to California's progress in achieving the 1994 SIP commitments. The ARB reached a settlement agreement with these groups in January 1999. The settlement agreement was amended in June 2003. Although the 2003 SIP revision is intended to replace the State's original commitments under the 1994 SIP for the South Coast, the settlement agreement will remain in place until the ARB fulfills its obligations under the agreement.

The agreement includes a list of measures to be considered by the ARB and a schedule. In this list of specific measures, ARB staff committed to propose to the Board by June 30, 2004, a control measure for a 2 tpd VOC emission reduction in the South Coast Air Basin if feasible. The implementation period for the control measure is 2006. The amendments to the Consumer Products Regulation proposed in this report are intended to fulfill the 2 tpd commitment and to partially fulfill the remaining VOC reduction commitment in the lawsuit settlement agreement.

5. National Consumer Products Regulations

On September 11, 1998, the U.S. EPA promulgated a national consumer products regulation, the "National Volatile Organic Compound Emission Standards for Consumer Products (40 CFR Part 59, Subpart C, Sections 59.201 et seq.; see the September 11, 1998, Federal Register, Vol. 63, No. 176, pages 48819-48847)." This action promulgates national VOC emission standards for 24 categories of consumer products. The rule became effective on September 11, 1998, and the VOC limits became effective on December 10, 1998. There are similarities and differences between the California and national consumer products regulations; however, the national rule does not preclude states from adopting more stringent regulations.

Although the national regulation is similar in many aspects to the California regulation, it is less effective in reducing VOC emissions from consumer products. The national regulation does not include second tier standards, mid-term measure categories, or aerosol coatings. The national regulation will achieve a 20 percent reduction in VOC emissions while California's existing consumer products and aerosol coatings regulations achieve a 40 percent reduction. Because California has unique air quality problems, we must reduce VOC emissions from consumer products to the

maximum extent feasible to attain the federal and state ambient air quality standards for ozone.

REFERENCES

Proposed 2003 State and Federal Strategy for the California State Implementation Plan; released August 25, 2003; adopted by ARB on October 23, 2003. (Statewide Strategy, 2003)
http://www.arb.ca.gov/planning/sip/stfed03/stfed03.htm

2003 South Coast Air Quality Management Plan
2003 Final Air Quality Management Plan; adopted by the South Coast Air Quality Management District Governing Board on August 1, 2003. (SCAQMD, 2003)
http://www.aqmd.gov/aqmp/AQMD03AQMP.htm

II.

DEVELOPMENT OF PROPOSED AMENDMENTS

A. PUBLIC PROCESS FOR DEVELOPING PROPOSED LIMITS

In this Chapter, we discuss the process used to involve the public in developing the 2004 Amendments and the staff evaluation of emission reduction strategies. In order to involve the public in the development of the proposed 2004 Amendments, a subcommittee of the Consumer Products Working Group, titled the Consumer Products Regulation Workgroup (CPRWG), was established in 2002. Participation in the CPRWG was open to any member of the public. The CPRWG participated in the development of the 2001 Survey and later the 2004 Amendments. Numerous meetings were held with the CPRWG while developing the survey.

Five public CPRWG meetings and one public workshop were conducted between March 2003 and March 2004 to develop the 2004 Amendments. At the first workgroup meeting in March 2003, staff discussed the logistics and timeline for the upcoming consumer products regulatory activity.

At the second CPRWG meeting, staff discussed the amended State Implementation Plan (SIP) settlement agreement, the reporting requirements for aerosol adhesives, the 2003 Consumer Products Survey (2003 Survey), and other general consumer products issues. Prior to the workgroup meeting, we posted the 2001 Survey Preliminary Data Summaries, a list of potential categories to be regulated, and a list of proposed regulatory changes to our consumer products website.

At the third CPRWG meeting, staff discussed proposed regulatory category definitions, proposed VOC limits for product categories identified at the second workgroup meeting, and specific language proposed for regulatory concept changes that were outlined at the second workgroup meeting.

At the fourth CPRWG meeting and Consumer Products Regulation public workshop, which were held on consecutive days, we presented the latest proposed regulatory category definitions with modified proposed VOC limits and updated language for the proposed regulatory changes. Some of the category definitions, VOC limits and proposed regulatory language were modified based on comments received, further staff analysis, and meetings with associations and individual companies. The public workshop was broadcast through our ARB webcast system, for those interested individuals who were unable to attend in person.

A chronology of the meetings held is shown in Table II-1. Workgroup meeting and workshop notices are contained in Appendix C.

Table II-1
Chronology of Workgroup Meetings and Public Workshop

Date	Meeting	Location
March 11, 2003	1st Workgroup Meeting for the CPRWG	Sacramento, CA with teleconference available
October 21, 2003	2nd Workgroup Meeting for the CPRWG	Sacramento, CA with teleconference available
December 16, 2003	3rd Workgroup Meeting for the CPRWG	Sacramento, CA with teleconference available
March 10, 2004	4th Workgroup Meeting for the CPRWG	Sacramento, CA with teleconference available
March 11, 2004	Public Workshop on the proposed 2004 Amendments	Sacramento, CA with webcast available

To solicit additional information and comments, staff held numerous individual meetings, teleconferences, and video conferences with industry representatives. At several of these meetings, requested by industry associations, industry representatives presented technical information related to reformulating of products for consideration in the rulemaking process. Staff also reviewed survey data, performed shelf surveys, and researched technical literature, patents, and trade journals during the development of the proposed 2004 Amendments.

B. STAFF EVALUATION OF EMISSION REDUCTION OPPORTUNITIES

Development of the proposed 2004 Amendments began with the review of the "2001 Consumer and Commercial Products Survey" (2001 Survey). The 2001 Survey covered about 48 categories of consumer products, representing an estimated 25 percent of the total consumer products inventory, on an emissions basis (Appendix D). The focus of the 2001 Survey was primarily on categories that had not previously been regulated and where an opportunity for emission reductions were identified. In addition, several categories were surveyed primarily for the purpose of improving inventory numbers or to gain a better understanding of a general category of products. The categories surveyed included a broad range of hydrocarbon-based solvents, adhesives, household and personal care products.

After the Survey data were compiled, staff prioritized product categories for possible regulation. This process began with the elimination of categories where staff believed no viable opportunity for reduction existed. As a result of this process, staff initially identified 20 product categories for potential emission reduction opportunities which included 18 previously unregulated categories and two categories that had been already regulated. The total VOC emissions from the identified categories comprised approximately 10.6 tpd statewide in 2001.

After further review, staff postponed consideration of some product categories to provide adequate time to evaluate the feasibility of VOC reductions and/or time to address complicated technical issues. In addition, staff revised emission estimates to address product mis-categorization, products that were already regulated under local air district rules, and reporting errors. The proposed VOC limits were developed based on the Survey results, input from interested parties, and identified repackaging opportunities and reformulation options.

During the workgroup and workshop process, staff presented specific proposals and alternatives to the public for consideration. After additional investigation of the product categories, staff added some product categories, deleted other categories, reorganized categories based on similarities in product function or other criteria, and increased or reduced the proposed VOC limits for product categories based on technical information provided by interested parties and staff's research efforts. Staff went through multiple iterations of presenting proposals, considering comments, and performing internal analysis, and as a result is currently proposing VOC limits for 15 product categories.

C. ALTERNATIVES CONSIDERED

The Government Code section 11346.2 requires the ARB to consider and evaluate reasonable alternatives to the proposed regulation and provide the reasons for rejecting those alternatives. Staff identified three alternatives approaches to the setting of proposed VOC limits: "No Action," "Set Different VOC Limits," and "Set VOC Limits for Different Categories."

Alternative One- No Action

A "No Action" alternative would be to not adopt the proposed new measures (i.e., VOC limits), or delay adoption of the proposed new measures. The citizens of California would not benefit from the improved air quality that would result from the reduction of VOC emissions and ground-level ozone being proposed. Associated health benefits would be lost, including the estimated reduction of potential excess cancers from the proposed ATCM for PDCB (See Chapter VII). "No Action" would result in failure to meet our CONS-1 SIP and SIP lawsuit settlement commitments (See Chapter I). In the case of not meeting the SIP commitments, there is a potential for loss of federal funds. Not meeting the SIP lawsuit settlement commitments could subject ARB to further litigation. However, this alternative would have no cost on business.

Alternative Two – Set Different VOC Limits

As was discussed in Subsection B above, staff thoroughly evaluated each category that was surveyed for which it was believed potential for emission reductions existed. Staff initially proposed limits that were perceived as attainable based on the information available at the time. Staff further evaluated the categories. Industry representatives provided additional information pertinent to the categories and in some

cases proposed alternative VOC limits. Staff analyzed each category and determined the most appropriate limit from all of the alternatives proposed or considered. Some of the limits were determined to be too high, in that they did not achieve the maximum feasible reductions, and others were determined to be too low, as they would have eliminated a product form, were too costly or were not deemed to be technologically or commercially feasible. The final proposal contained limits that were determined to obtain the maximum feasible reduction, were commercially and technologically feasible, preserved product forms as required by law, were cost effective, and together achieved the necessary emission reductions to meet the ARB's commitments.

Alternative Three – Set VOC Limits for Different Categories

Staff had initially proposed 20 categories for regulation. Upon further analysis of available information and industry comments, some categories were eliminated from consideration. Staff believed, based on the available information, that it was not appropriate to regulate every category initially proposed for regulation. Considering all available information, staff determined that for certain categories, the setting of VOC limits would not achieve significant reductions, or could not be set such that it could be demonstrated that the limits were commercially or technologically feasible, or cost effective. Staff proposed VOC limits for 15 categories that would together achieve the maximum feasible reductions and meet the ARB's commitments. It should be noted that ARB has already set VOC limits for over 80 categories of consumer products and did not consider regulating all but two of the already regulated categories in these regulatory amendments.

III.

TECHNICAL BASIS FOR THE PROPOSED AMENDMENTS

In this Chapter, we discuss the Board's requirements to adopt regulations that are technologically and commercially feasible. Health and Safety Code section 41712 requires all consumer product regulations adopted by the Board to be technologically and commercially feasible. During the development of the Phase I and II consumer product regulations, the ARB staff established guidelines in setting the limits to ensure that these statutory criteria were met. Also, 1996 revisions to section 41712 require that consumer product regulations not eliminate a product form. These guidelines and statutory criteria were followed in setting the proposed limits for the Mid-term Measures I and II categories, and now for the 2004 Amendments. A detailed discussion of the technical basis for each proposed limit is included in Chapter VI of the Technical Support Document.

The VOC limits proposed in the 2004 Amendments were set based on the lower volatile organic compound (VOC) content technologies existing within a product category, or are based on low emitting technology transfer from other products. In doing this, staff made sure that the various product forms within each category would be preserved. For the majority of the categories proposed for regulation, there are products on the market which currently comply. While there are no complying products currently available in the market place for Gasket or Thread Locking Adhesive Remover, Aerosol Anti-static Product, Aerosol Graffiti Remover, Aerosol Hair Styling Product, Pump Spray Toilet/Urinal Care Product and Aerosol Wood Cleaners, lower emission technology exists for achieving the proposed weight percent VOC limits. Below we will discuss the terms "technologically feasible" and "commercially feasible."

A. TECHNOLOGICALLY FEASIBLE

Health and Safety Code section 41712(b) requires the Board to adopt consumer product regulations that are "technologically feasible". Technological feasibility is a different concept than "commercial feasibility", and does not take into account the cost of the complying product. Staff believes that a proposed limit is technologically feasible if it meets at least one of the following criteria: (1) the limit is already being met by at least one product within the same category, or (2) the limit can reasonably be expected to be met in the time frame provided through additional development efforts. With the exception of the Gasket or Thread Locking Adhesive Remover, Aerosol Graffiti Remover, Aerosol Hair Styling Product, Pump Spray Toilet/Urinal Care Product and Aerosol Wood Cleaner categories, our survey results show that products are currently marketed that comply with the proposed limits for all of the product categories under consideration. In the case of the categories for which currently complying products do not exist, reformulation options are available which will allow manufacturers to produce complying products with the time allowed for development. As explained in Chapter VI, manufacturers can use exempt solvents such as acetone and exempt propellants to reformulate these products, and staff has proposed an effective date of December 31,

2006, for all but two categories, to allow time to develop viable formulations. An extra two years has been provided for the proposed VOC limit for Aerosol Anti-static Product. An extra three years to comply is proposed for a second tier VOC limit for Shaving Gels to achieve compliance. The later effective dates of December 31, 2008 and December 31, 2009, are provided to acknowledge the fact that staff anticipates reformulation efforts or packaging process changes needed to achieve these VOC limits to be challenging. Given the length of time and the possibilities for reformulation, staff believes that the proposed weight percent VOC limit for these categories are technologically feasible.

In setting the proposed limits for the 2004 Amendment categories, staff made an effort, wherever possible, to ensure that multiple reformulation technologies exist which would allow products to comply. Proposed limits were set at VOC levels that staff determined could be met without increased use of Toxic Air Contaminants or ozone-depleting compounds. General reformulation options include addition of water with co-solvents, development of emulsion products, use of low vapor pressure volatile organic compound solvents, use of non-VOC propellants, and use of exempt solvents. Multiple reformulation options allow flexibility in the design of compliant products, ensuring that efficacious, cost-effective products will be brought to the marketplace.

B. COMMERCIALLY FEASIBLE

Health and Safety Code section 41712(b) also requires the Board to adopt consumer product regulations that are "commercially feasible." The term "commercially feasible" is not defined in State law. In interpreting this term, the staff has utilized the reasoning employed by the United States Court of Appeals for the District of Columbia in interpreting the federal Clean Air Act. In the leading case of International Harvester Company v. Ruckelshaus, (D.C. Cir. 1973) 478 F. 2d 615, the Court held that the United States Environmental Protection Agency could promulgate technology-forcing motor vehicle emission limits which might result in fewer models and a more limited choice of engine types for consumers, as long as the basic market demand for new passenger automobiles could be generally met.

Following this reasoning, the staff has concluded that a regulation is "commercially feasible" as long as the "basic market demand" for a particular consumer product can be met. "Basic market demand" is the underlying need of consumers for a product to fulfill a basic, necessary function. This must be distinguished from consumer "preference", which may be towards specific attributes of a particular product. A "preference" is the choice of consumers for a certain product or products based upon fragrance, cost, texture, etc. By way of example, a consumer may need a glass cleaner to remove soils, grease, dirt or grime from their windows. Glass cleaners are formulated with glycol ether solvents or with ammonia. Consumers may choose an ammoniated glass cleaner because they prefer the performance characteristics, or they may choose a non-ammoniated glass cleaner because they dislike the smell of ammonia. This distinction is not recognized by all parties. Some commenters have expressed the view that consumers do not have a "basic market demand" for a general

class of products, but that consumers instead have a number of separate and distinct "basic market demands" for many specialty products with differing characteristics.

The ARB staff believes the consumer "preference" interpretation of "basic market demand" is inconsistent with the reasoning from the International Harvester case. To adopt such a narrow interpretation would be inconsistent with the clearly expressed legislative intent that "...the state board shall adopt regulations to achieve the maximum feasible reduction in reactive organic compounds emitted by consumer products..." (Health and Safety Code section 41712(a)). In order to achieve emission reductions, manufacturers of high VOC products which perform the same basic function as lower VOC counterparts must reduce the VOCs in their products. It is expected that when a product formulation changes, some attributes of the product will also change. If ARB were to establish limits which accounted for every distinct feature of every product, then each product would require a limit unto itself. Using this approach, it would be difficult to achieve the maximum feasible reduction in VOC emissions because changes in formulation would change product features.

Every currently marketed product has some unique features that differentiate it from other products. Consumers who purchase a product have demonstrated a preference over other competing products. This distinction between "preference" and "basic market demand" was clearly made in the International Harvester case. In the International Harvester case, the court stated that the proposed emissions limits would be feasible even though they might result in the unavailability of certain kinds of vehicles and engine types people preferred (e.g. fast "muscle" cars), as long as the basic market demand for passenger cars could be generally met. Applying this principle to consumer products, the proposed 2004 Amendments allow the basic market demand to be met for each product category, even though it may no longer be possible to manufacture products with some specific attributes. The ARB staff believe that this approach complies with section 41712.

IV.

EMISSIONS

California's extreme air quality problems require unique strategies for meeting federal and state ambient air quality standards. In this Chapter we provide an overview of these air quality problems and the need for significant emission reductions from all sources of air pollution. We also describe the need for the regulation of consumer products and provide a summary of the emissions from the categories proposed for regulation, for a detailed summary of the product categories see Chapter VI.

A. AMBIENT AIR QUALITY AND THE NEED FOR EMISSIONS REDUCTIONS

Volatile organic compound (VOC) emissions contribute to the formation of both ozone and fine particulate matter (PM). Ozone formation in the lower atmosphere results from a series of chemical reactions between VOCs and nitrogen oxides in the presence of sunlight. PM is the result of both direct and indirect emissions. Direct sources of PM include emissions from fuel combustion and wind erosion of soil. Indirect PM emissions result from the chemical reaction of VOCs, nitrogen oxides, sulfur oxides and other chemicals in the atmosphere. Federal and state ambient air quality standards for these contaminants have been established to protect California's population from the harmful effects of ozone and PM.

Ozone

VOCs and nitrogen oxides (NO_x) react in the presence of sunlight to form ozone. The rate of ozone generation is related closely to both the amount and reactivity of VOC emissions as well as the amount of NO_x emissions available in the atmosphere (U.S. EPA, 1996; Seinfeld and Pandis, 1998). Ozone is a colorless gas and the chief component of urban smog. It is one of the state's more persistent air quality problems. Air quality data have revealed that 75 percent of the nation's exposure to ozone occurs in California (ARB, 1994). As shown in Figure IV-1, the population-weighted average exposure to ozone concentrations above the state ambient air quality standard (of 0.09 parts per million) in the South Coast Air Basin has been declining. However, despite this decline and nearly 25 years of regulatory efforts, ozone continues to be an important environmental and health concern.

It has been well documented that ozone adversely affects the respiratory functions of humans and animals. Human health studies show that short-term exposure to ozone injures the lung (ARB, 2000b, 1997; U.S. EPA, 1996). In some animal studies, permanent structural changes with long-term exposures to ozone concentrations considerably above ambient were noted; these changes remain even after periods of exposure to clean air (U.S. EPA, 1996). Ozone is a strong irritant that can cause constriction of the airways, forcing the respiratory system to work harder in order to provide oxygen to the body. Ozone is a powerful oxidant that can damage the respiratory tract, causing inflammation and irritation, and induces symptoms such as

coughing, chest tightness, shortness of breath, and worsening of asthma symptoms (U.S. EPA, 1996). Ozone in sufficient doses increases the permeability of lung cells, rendering them more susceptible to toxins and microorganisms.

The greatest risk is to those who are more active outdoors during smoggy periods, such as children, athletes, and outdoor workers. Exposure to levels of ozone above the current ambient air standard leads to lung inflammation and lung tissue damage, and a reduction in the amount of air inhaled into the lungs. Recent evidence has, for the first time, linked the onset of asthma to exposure to elevated ozone levels in exercising children (McConnell 2002).

Over the past 10 years, the ARB has conducted the "Epidemiologic Investigation to Identify Chronic Health Effects of Ambient Air Pollutants in Southern California," a long-term study that is documenting the lung development of children in 12 cities in California (also know as the "Children's Health Study"). The air quality in these 12 communities varies from good to moderate and poor, so any trends in lung development may be determined. A final report on the Children's Health Study will be available at the end of May 2004. Major results of the study include the following findings:

- Children that have been exposed to current levels of air pollution have significantly reduced lung growth and development when exposed to higher levels of acid vapor, ozone, nitrogen dioxide and particulate matter which is made up of very small particles that can be breathed deeply into the lungs (Gauderman *et al.,* 2002).

- Children living in high ozone communities who actively participate in several sports are more likely to develop asthma than children in these communities not participating in sports (McConnell *et al.,* 2002).

- Children living in communities with higher concentrations of nitrogen dioxide, particulate matter, and acid vapor have lungs that develop and grow more slowly and are less able to move air through them (Gauderman *et al.,* 2002, 2000). This decreased lung development may have permanent adverse effects in adulthood.

- Children who moved away from study communities had increased lung development if the new communities had lower particulate matter levels, and had decreased lung development if the new communities had higher particulate matter levels (Avol *et al.,* 2001).

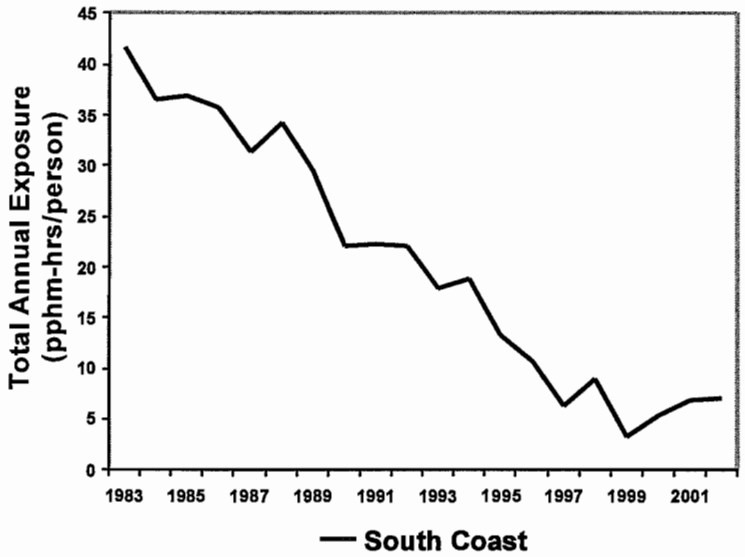
- Days with higher ozone concentrations resulted in significantly higher school absences due to respiratory illness (Gilliland *et al.,* 2000).

- Children with asthma who are exposed to higher levels of particulate matter are much more likely to develop bronchitis (McConnell *et al.,* 2003).

In addition, staff of the ARB and the Office of Environmental Health Hazard Assessment (OEHHA) are currently reviewing the scientific literature on public exposure, atmospheric chemistry, and health effects of exposure to ozone. This work follows a preliminary evaluation of all health-based ambient air quality standards in December 2000 to determine their adequacy to protect public health, particularly that of infants and children required by The Children's Environmental Health Protection Act (Senate Bill 25, Escutia, 1999).

One requirement of The Children's Environmental Health Protection Act is that the ARB, in consultation with OEHHA, review all of California's health-based ambient air quality standards by December 31, 2000 (Senate Bill 25, Escutia, 1999). The purpose of the review was to determine whether the standards adequately protect public health, especially the health of infants and children. The findings are summarized in the report, "Adequacy of California Ambient Air Quality Standards: Children's Environmental Health Protection Act" (ARB, 2000b). This report found that the standards for particulate matter, ozone, and nitrogen dioxide are inadequate to protect public health. The standards for particulate matter (PM10 and sulfates) were found to have the highest priority for revision. At its December 9, 2000, Public Meeting, the Board approved the report and urged staff to work as expeditiously as possible to present them with recommendations due to the serious impact of these pollutants on the health of Californians.

Figure IV-1
Population-Weighted Exposure to Ozone Concentrations
Above the State Ambient Air Quality Standard



Not only does ozone adversely affect human and animal health, but it also affects vegetation throughout most of California resulting in reduced yield and quality in agricultural crops, disfiguration or unsatisfactory growth in ornamental vegetation, and damage to native plants. During the summer, ozone levels are often highest in the urban centers in Southern California, the San Joaquin Valley, and Sacramento Valley, which are adjacent to the principal production areas in the state's multibillion-dollar agricultural industry. ARB studies indicate that ozone pollution damage to crops is estimated to cost agriculture over 300 million dollars annually (ARB, 1987). Similarly, the U.S. EPA estimates national agricultural losses to exceed 1 billion dollars annually (U.S. EPA, 1996). Elevated levels of ozone also cause damage to materials such as rubber, paints, fabric, and plastics.

Fine Particulate Matter

Fine particulate matter (PM) is prevalent in the urban atmosphere (see, for example, Pandis *et al.,* 1992), and ambient PM, especially those with aerodynamic diameters less than two and a half micrometers ($PM_{2.5}$) is known to have negative impacts on human health (Schwartz *et al.*, 1996; Moolgavkar and Luebeck, 1996). Like ozone, PM can be formed via atmospheric oxidation of organic compounds (Finlayson-Pitts and Pitts, 2000). According to the results from several recent studies, photochemically derived PM (i.e. secondary organic aerosol) could contribute up to 80 percent of the fine particle burden observed in severe air pollution episodes (Pandis *et al.,* 1992; Turpin and Huntzicker, 1991, 1995). In urban PM, these secondary organic aerosols could produce effects such as visibility degradation and toxicity (see, for example Atkinson and Arey, 1994).

Significant advances have been made in the theoretical and the experimental studies of the formation of secondary organic aerosols (SOA) (Pankow, 1994a, 1994b; Odum *et al.,* 1996; Seinfeld and Pandis, 1998; Harner and Bidleman, 1998; Kleindienst, *et al.,*1999; Yu *et al.,* 1999). In addition, modeling techniques to determine the amount of ozone as well as the amount of aerosol formed from a VOC have been established (Bowman *et al.,* 1995), and the concept similar to maximum incremental reactivity is being applied to quantitatively assess the aerosol formation potential of a VOC (i.e. incremental aerosol reactivity) (Griffin *et al.,* 1999). Based on the results of these studies, we now know that there is a mechanistic linkage between the ozone formation and SOA formation of a VOC.

Although most organic compounds contribute to ozone formation (Carter, 2000), secondary organic aerosol is usually formed from photooxidation of organic compounds with carbon numbers equal to seven or more (Grosjean and Seinfeld, 1989; Wang *et al.,*1992). This observation is consistent with the fact that both reactivity and product's volatility need to be considered for evaluating the aerosol formation potential of a VOC (Odum *et al.*, 1997). It has also been shown that aromatic compounds are more likely to participate in the formation of SOA than are alkanes (Grosjean, 1992; Pandis *et al.,* 1992). In other words, only chemicals which react fast enough in the

atmosphere will generate sufficient amounts of low volatility products for forming aerosols.

Airborne PM can be solid or liquid in form, and can be directly emitted into the atmosphere as the result of anthropogenic actions such as fuel combustion or natural causes such as wind erosion. PM_{10} (PM with less than (<) 10 microns determined as the equivalent aerodynamic diameter) can cause adverse health effects and also contributes to reduced visibility. PM_{10}, and specifically, its smaller fraction, $PM_{2.5}$, can be inhaled deep into the lungs and also disrupt cellular processes. The particulate matter irritates the respiratory tract, and may contain toxic as well as carcinogenic compounds (Godish, 1991). Premature deaths linked to particulate matter are now at levels comparable to traffic accidents and second-hand smoke (ARB 2002a).

Population-based studies in hundreds of cities in the United States and around the world have demonstrated a strong link between elevated particulate levels and premature deaths, hospital admissions, emergency room visits and asthma attacks. These studies indicate that certain populations are particularly sensitive to PM, including the elderly, persons suffering from lung or cardiopulmonary disease, infants and children, and asthma sufferers. Among children, decrements in lung function occur, leading to increased school absences, and asthmatic individuals may suffer from increased respiratory symptoms. Among the elderly and in individuals suffering from cardiopulmonary disease, exacerbation of chronic disease leading to increased hospital admissions are seen (U.S. EPA, 1997). Groundbreaking long-term studies of children's health conducted in California have demonstrated that particle pollution may significantly reduce lung function growth in children (Peters *et al.,* 1999, Avol *et al.,* 2001, Gauderman *et al.,* 2002).

The findings of the ARB and OEHHA report, "Adequacy of California Ambient Air Quality Standards: Children's Environmental Health Protection Act" found that the standards for particulate matter (PM10 and sulfates) have the highest priority for revision (ARB, 2000b). At a December 9, 2000, Public Meeting, the ARB approved the report and urged staff to work as expeditiously as possible to present them with recommendations due to the serious impact of these pollutants on the health of Californians. On June 20, 2002, the Board adopted staff's recommendations, and the revised standards became effective on July 5, 2003. The revised PM_{10} standard is 20 $\mu g/m^3$ for an annual average. In addition, the ARB adopted a fine PM ($PM_{2.5}$) standard (particles with a mean aerodynamic diameter of 2.5 microns or less), set at 12 $\mu g/m^3$ for an annual average.

The Federal and state ambient air quality standards for ozone and PM are shown in Table IV-1. The state hourly ozone standard is 0.09 parts per million (ppm) and the national hourly ozone standard is 0.12 ppm. The state PM_{10} standard for a 24-hour period is 50 micrograms per cubic meter ($\mu g/m^3$), and the national standard is 150 $\mu g/m^3$ over a 24 hour period.

Table IV-1
Ambient Air Quality Standards for Ozone and PM_{10}

Pollutant	Averaging Time	State Standard	National Standard
Ozone	1 hour	0.09 ppm (180 $\mu g/m^3$)	0.12 ppm (235 $\mu g/m^3$)
	8 hour	---	0.08 ppm (157 $\mu g/m^3$)
PM_{10}	24 hour	50 $\mu g/m^3$	150 $\mu g/m^3$
	Annual Arithmetic Mean	20 $\mu g/m^3$	50 $\mu g/m^3$
$PM_{2.5}$	24 hour	---	65 $\mu g/m^3$
	Annual Arithmetic Mean	12 $\mu g/m^3$	15 $\mu g/m^3$

In 1997, the U.S. EPA promulgated a new 8-hour ozone ambient air quality standard (U.S. EPA, 1997). However, a court decision put implementation of the new standard on hold until legal challenges were resolved. On April 15, 2004, U.S. EPA designated nonattainment areas for the new eight-hour ozone standard effective June 15, 2004 (U.S. EPA, 2004a, 2004b). In California, many of these areas are already nonattainment for the federal 1-hour standard. New nonattainment areas include a number of rural Sierra foothill counties and additional parts of the Sacramento Valley. This action starts the transition from the one-hour standard to the eight-hour standard. The one-hour standard will be revoked on June 15, 2005, one year after the effective date of the designation.

State implementation plans (SIPs) showing how each area will meet the federal eight-hour standard are due by 2007. In order to maintain progress towards clean air, the Clean Air Act prohibits backsliding on the control program. Since the eight-hour standard is more health-protective than the federal one-hour standard, ARB expects that California will need to reduce emissions beyond the existing one-hour SIP targets. All major urban areas in California continue to violate the federal and state ozone standards, and need additional emission reductions in ozone precursors – such as VOC's – to attain these health-based standards.

The U.S. EPA also recently adopted standards for particulate matter less than 2.5 microns ($PM_{2.5}$) in addition to the PM_{10} standards (U.S. EPA, 1997). $PM_{2.5}$ consists of directly emitted particulate matter, and secondary particulate matter such as nitrates, sulfates and condensibles that are formed in the atmosphere from precursors such as NOx, ammonia, SOx and complex hydrocarbons. Because $PM_{2.5}$ is a subset of PM_{10}, these precursors contribute to PM_{10} pollution as well. In 2002, California established an annual average $PM_{2.5}$ standard of 12 $\mu g/m^3$, which is more health-protective than the federal standard (15$\mu g/m^3$).

The court decision also affects the particulate matter standards. However, U.S. EPA set the implementation schedule for the $PM_{2.5}$ standards on a time line to

allow the agency to complete its next review of the particulate matter standards in 2002 prior to designating non-attainment areas and requiring implementation plans for $PM_{2.5}$. The review of the PM standards is still ongoing with intent to make the final rulemaking on PM at the end of 2005. With this lengthy time line, we expect the legal challenges and uncertainty regarding the $PM_{2.5}$ standards to be resolved. Meanwhile, PM_{10} non-attainment areas will continue to implement their plans to attain the pre-existing PM_{10} standards.

The vast majority of California's population who live in urban areas breathe unhealthy air for much of the year, in Figure IV-2 shows the number of days the State AAQS were exceeded in 2000 in several air basins in California (ARB, 2003). Lastly, Figures IV-3 and IV-4 show that unhealthy levels of ozone and PM_{10}, respectively, are not limited to just urban areas, but can be found in nearly every county in California. As shown in these maps for 2002, 46 counties are currently designated as nonattainment (or nonattainment-transitional, which is a subcategory of nonattainment) for the state ozone standard, while 54 counties are designated as nonattainment for the state PM_{10} standard (ARB, 2002b). These counties contain over 98 and 99 percent, respectively, of California's population in 2002, a clear indication of the extent and magnitude of the ozone and PM_{10} problems in California. Figures IV-5 and IV-6 show maps identifying counties not in attainment with the federal standards.

Figure IV-2

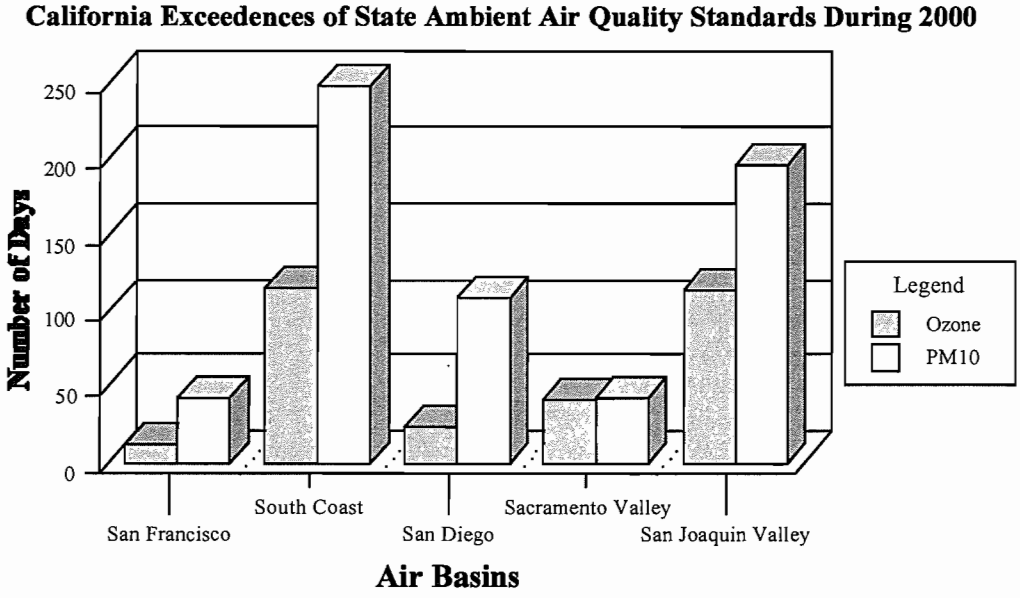

California Exceedences of State Ambient Air Quality Standards During 2000
Number of Days
250
200
150
100
50
0
San Francisco
South Coast
San Diego
Sacramento Valley
San Joaquin Valley
Air Basins
Legend
Ozone
PM10

Figure IV-3
Area Designations for State Ambient Air Quality Standard for Ozone

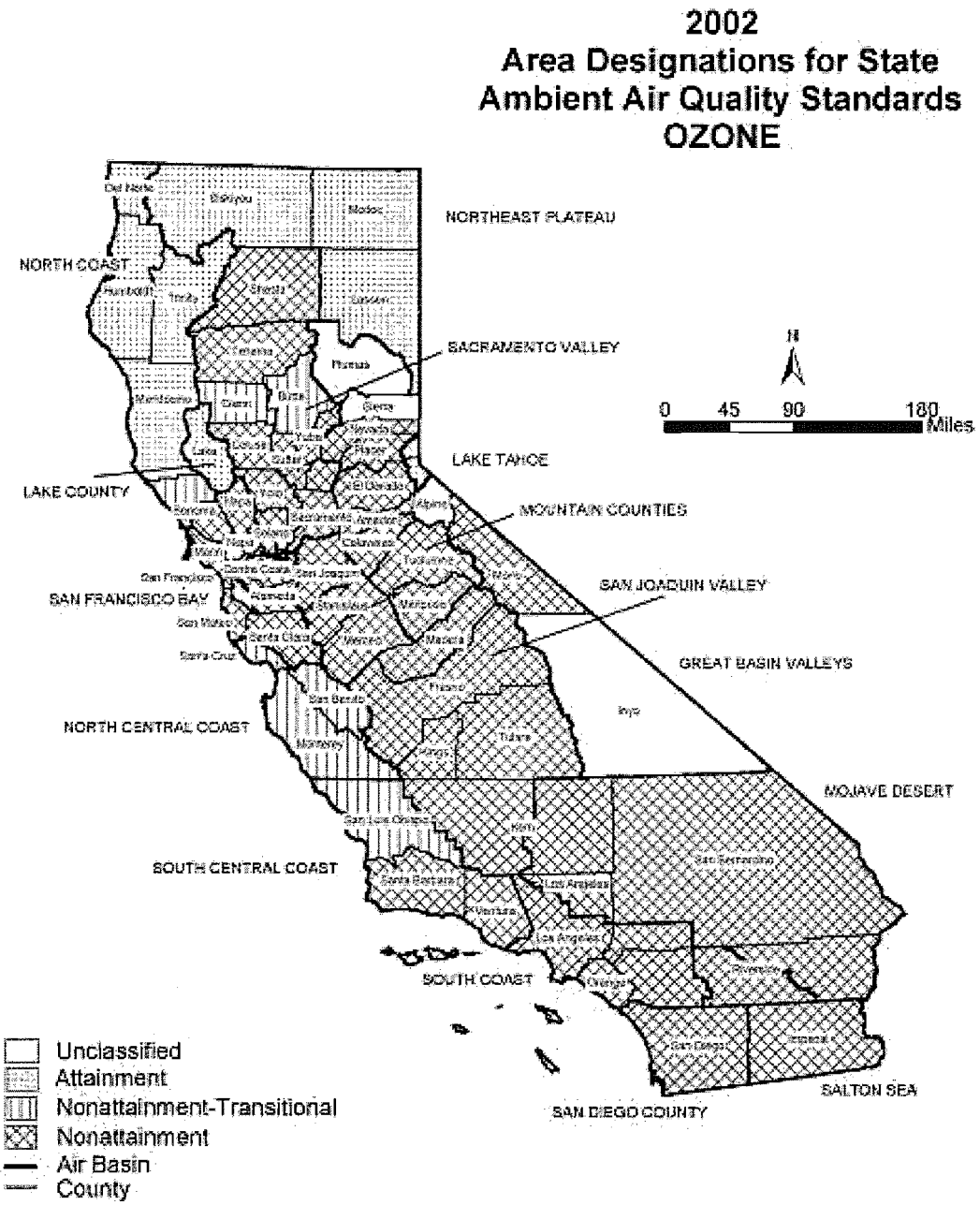


Figure IV-4
Area Designations for State Ambient Air Quality Standard for PM_{10}

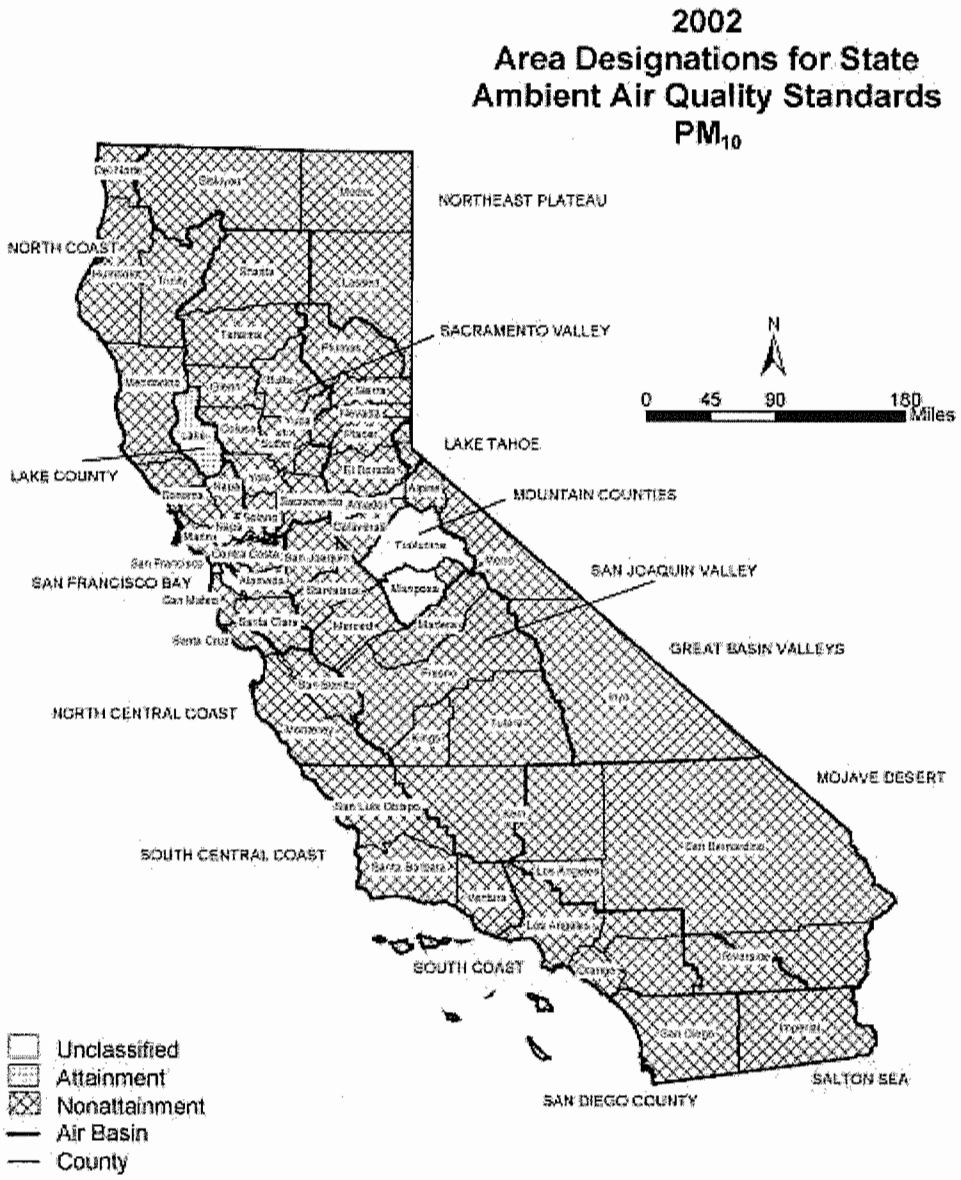


Figure IV-5
Area Designations for National Ambient Air Quality Standard for Ozone

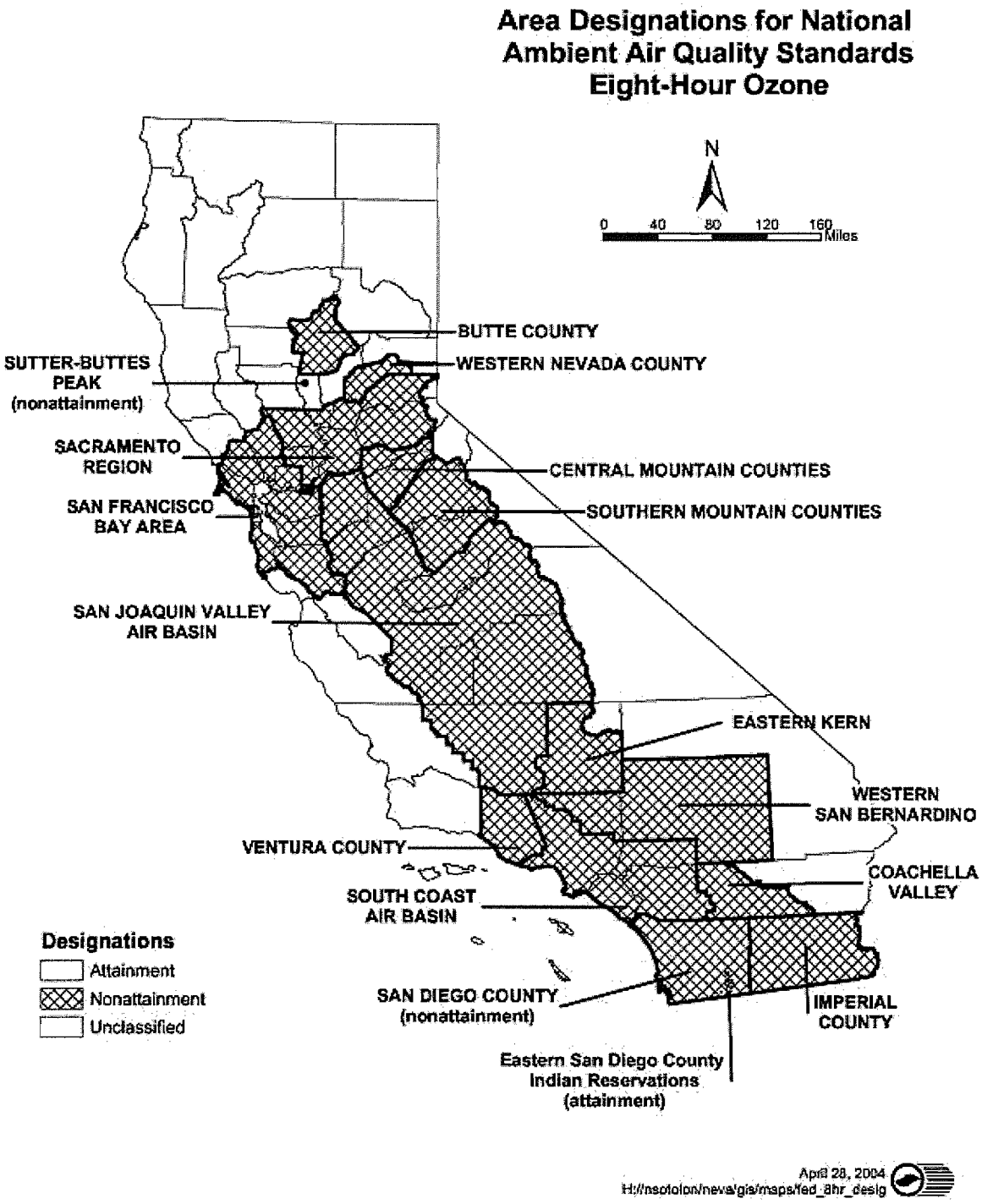
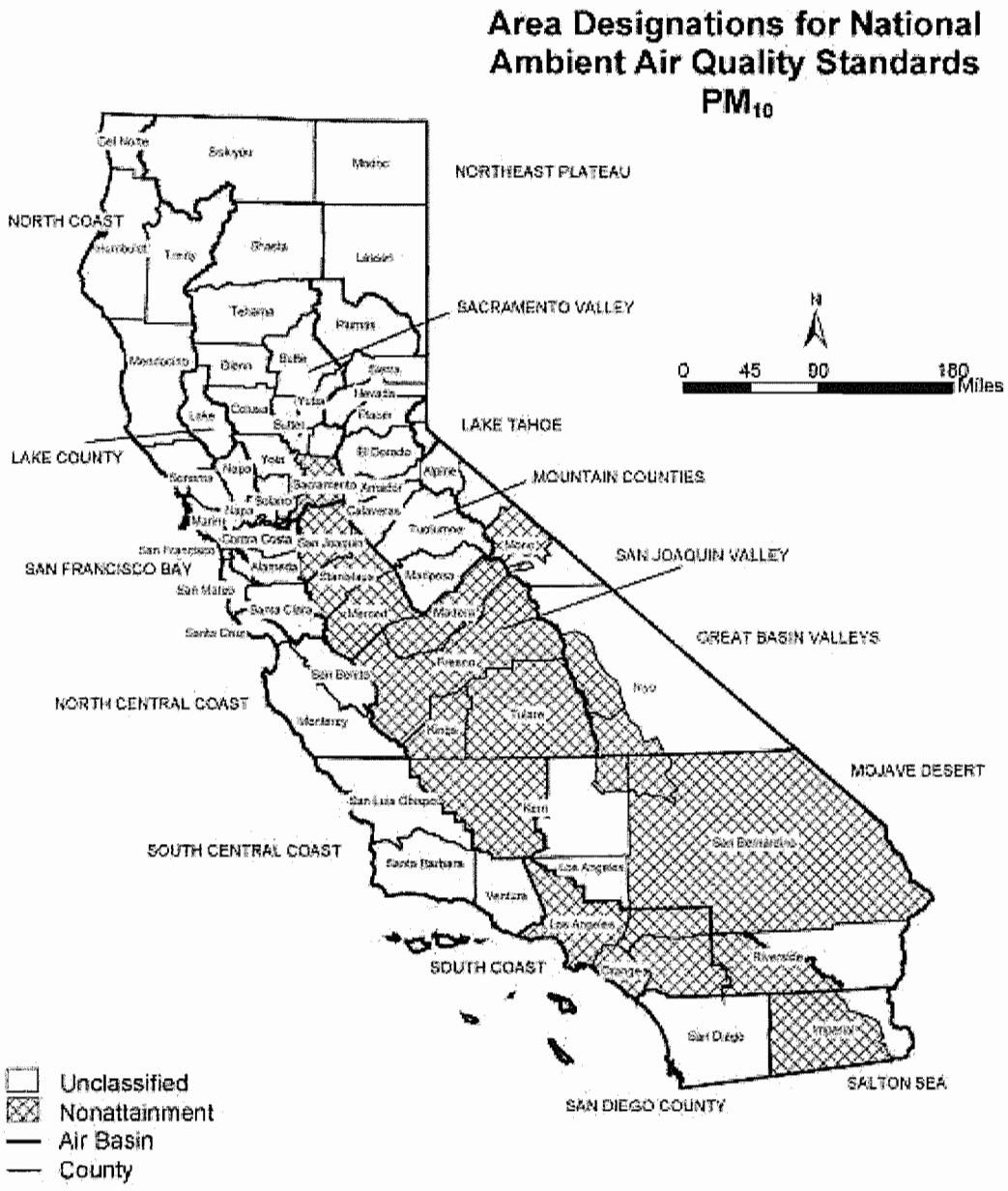


Figure IV-6
Area Designations for National Ambient Air Quality Standard for PM_{10}



B. WHY REGULATE CONSUMER PRODUCTS?

A consumer product is defined as a chemically formulated product used by household and institutional consumers. Consumer products include, but are not limited to: detergents; cleaning compounds; polishes; floor finishes; cosmetics; personal care products such as antiperspirants and hairsprays; home, lawn, and garden products; disinfectants; sanitizers; automotive specialty products; and aerosol paints. Other paint products, such as furniture or architectural coatings, are not part of ARB's consumer products program because local air districts regulate them.

Consumer products are a significant source of VOC emissions in California and contribute to the formation of both ozone and particulate matter pollution. Although each consumer product may seem to be a small source of emissions, the cumulative use of these products by over 35 million Californians results in significant emissions. Consumer products accounted for approximately 267 tons per day (tpd) of VOC emissions in the year 2000, which comprised about eight percent of the total man-made VOC emissions statewide. Volatile organic compound emissions from consumer products lead to the formation of ozone and are a significant source of air pollution in California. Further reductions in VOC emissions from consumer products and other VOC sources are needed if ozone standards are to be achieved.

As a result of several regulations adopted by the ARB over the last fifteen plus years, emissions from consumer products and aerosol coatings have decreased, and continued reductions are projected through 2005. As a result of these measures, statewide consumer product emissions have been reduced by over 130 tpd ROG (40 percent reduction) in 2005. Due to population growth, and without additional controls, staff expects the trend of emissions reductions to reverse once the last of the already adopted standards takes effect in 2005.

Over the past 25 years, air pollution agencies in California have been working diligently to improve air quality. Much of the effort was directed to the more traditional sources of air pollution such as mobile sources (e.g., cars, trucks, etc.) and stationary sources (e.g., factories, power plants, etc.). There have been dramatic gains in reducing emissions from these traditional sources. However, to continue to make progress toward meeting the state and federal ambient air quality standards and protecting the public health of California citizens, there is a need for further reductions from other sources of emissions including consumer products. Also, as emissions from the traditional sources are further reduced, emissions from all other sources, including consumer products, have become more significant. Therefore, the emissions from these sources must be evaluated for possible reductions.

Air shed modeling conducted during development of California SIPs has shown that VOC emission reductions lead to reduced ozone in metropolitan areas. Depending on the area, NO_x emission reductions can lead to reductions or increases in peak ozone concentrations. Due to low VOC to NO_x ambient ratios in the South Coast Air Basin (SoCAB), NO_x emission reductions lead to increases in the basin peak ozone

concentration on episodic days. However, NO_x emission reductions are necessary to reduce secondary PM nitrate concentrations. During the SIP development modeling process, the NO_x emission target is identified during the PM planning phase. A series of emission reduction simulations are made to estimate a "target" carrying capacity for VOC for the given basin NO_x emission level. Many control measures are needed to reduce both VOC and NO_x emissions to the desired target levels. This VOC – NO_x interaction is discussed further in the "Final Program Environmental Impact Report, Suggested Control Measure for Architectural Coatings," June 2000 (ARB, 2000a).

Previous modeling studies for the South Coast Air Basin have shown that consumer product VOC emission reductions reduce both ozone peak concentrations and population exposure to ozone (ARB, 1996). Therefore, consumer products control measures represent an important part of the VOC reductions needed to achieve the ozone standards.

Recognizing the importance of the potential impact of VOC emissions from consumer products, the California Legislature enacted the California Clean Air Act of 1988 (the Act). The Act declared that attainment of the California state ambient air quality standards is necessary to promote and protect public health, particularly the health of children, older people, and those with respiratory diseases. The Act added section 41712 to the California Health and Safety Code (HSC), which requires the ARB to adopt regulations to achieve the maximum feasible reduction in VOCs emitted by consumer products. As part of the regulatory process, the ARB must determine that adequate data exist to adopt the regulations. The ARB must also determine that the regulations are technologically and commercially feasible, necessary, and do not eliminate any product form. To date, VOC standards for 83 categories of consumer products (including antiperspirants and deodorants and aerosol coatings (36 categories)) have been established to meet the requirements of the Act.

The regulations adopted to date will achieve a 40 percent reduction in VOC emissions from consumer products by the year 2005. Since significant further VOC reductions are necessary to attain the federal ozone standard, the reductions from the 2004 Amendments proposed in this report are therefore "necessary" within the meaning of section 41712 of the HSC. In addition, section 41712(b)(1) of the HSC provides that a regulation's "necessity" is to be evaluated in terms of both the state and federal standards. The 2003 Ozone SIP only addresses the ARB's commitments to achieve the federal 1-hour air quality standard for ozone. The state ozone standard is more stringent than the federal 1-hour standard, and will require even greater emission reductions to achieve attainment.

The applicable state and federal laws show that both the U.S. Congress and the California Legislature intended progress toward clean air to be made as quickly as possible. The Act specifically declares that it is the intent of the Legislature that the state air quality standards be achieved "...by the earliest practicable date..." (see HSC, sections 40910 and 40913(a); see also the uncodified section 1(b)(2) of the Act (Stats. 1988, Chapter 1568)). A similar intent is expressed in the federal Clean Air Act, which

declares that the federal air quality standards are to be achieved "...as expeditiously as practicable..." (see sections 172(a)(2), 181(a), and 188(c) of the federal Clean Air Act). For all of the reasons described above, the proposed amendments are "necessary" within the meaning of HSC section 41712.

On November 15, 1994, ARB adopted the California State Implementation Plan for Ozone (SIP). The SIP serves as California's overall plan for attaining the federal ambient air quality standard for ozone. Achieving significant VOC reductions from consumer products is a key element of the SIP. The consumer products element of the SIP is comprised of Near-term, Mid-term, and Long-term measures. The Near-term measures are comprised of the Phase I and II consumer products regulations (and other ARB regulations related to consumer products). The Mid-term measures commitment was partially fulfilled by the Phase III and Mid-term Measures II amendments to the Consumer Products Regulation.

In 1997, three environmental groups (Communities for a Better Environment, the Coalition for Clean Air, and the Natural Resources Defense Council) filed a complaint in the United States District Court for the Central District of California. The lawsuit was filed against ARB, the South Coast Air Quality Management District, and the United States Environmental Protection Agency (U.S. EPA) related to California's progress in achieving the 1994 SIP commitments. In January 1999, the ARB and these groups reached a settlement agreement, which was amended in December 1999 and June 2003 (U.S. District Court, Central District of CA, Case No. CV-97-6916 JSL (SHx)). Although the SIP was revised in October 2003 (discussed below) to replace the State's original commitments under the 1994 SIP for the South Coast, the settlement agreement will remain in place until ARB fulfills its obligations under the agreement.

The settlement agreement includes a list of measures to be considered by the ARB and a schedule. Included in the list of specific measures, the ARB staff committed to propose to the Board by June 30, 2004, a control measure for a 2 tons per day VOC emission reduction in the South Coast Air Basin, if feasible. The implementation period for the control measure is 2006. The amendments to the Consumer Products Regulation proposed in this staff report are intended to fulfill this commitment and to partially fulfill the remaining VOC reduction commitment in the settlement agreement.

On October 23, 2003, ARB adopted *the Proposed 2003 State and Federal Strategy for the California State Implementation Plan* (Statewide Strategy) which reaffirms ARB's commitment to achieve the health-based air quality standards through specific near-term actions and the development of additional longer-term strategies. The Statewide Strategy identifies the Board's near-term regulatory agenda to reduce ozone and particulate matter by establishing enforceable targets to develop and adopt new measures for each year from 2003 to 2006, including commitments for the Board to consider 19 specific measures. It also sets into motion a concurrent initiative to identify longer-term solutions to achieve the full scope of emission reductions needed to meet federal air quality standards in the South Coast and San Joaquin Valley by 2010. In

addition to meeting federal requirements, this Strategy ensures continued progress towards California's own health-based standards.

In the 2003 State Strategy, ARB committed to two primary measures specific to consumer products and future reductions:

- **Measure CONS-1: Set New Consumer Products Limits for 2006.** The ARB has committed to develop a measure to be proposed to the Board by 2004 and implemented by 2006 that would reduce VOC emissions from consumer products by at least 5.3 tpd statewide in 2010.

- **Measure CONS-2: Set New Consumer Products Limits for 2008-2010.** The ARB has committed to develop new consumer product category limits to be proposed to the Board in 2006 and 2008, with implementation in 2008 and 2010, that would reduce VOC emissions from consumer products by 20-35 tpd statewide in 2010.

- **Further Reductions from Consumer Products.** In addition, it is expected that further emission reductions will be needed from all source categories, including consumer products, to meet the long-term emission reduction targets included in the South Coast SIP.

The 2004 Amendments proposed in this staff report are intended to fulfill the commitment for SIP measure CONS-1.

ARB and local air districts are in the process of updating the California SIP to show how each region in the state will meet the federal air quality standards. The measures outlined in the adopted Statewide Strategy are being incorporated into these SIP revisions. The South Coast's 2003 Air Quality Management Plan was adopted by the South Coast Air Quality Management District Governing Board on August 1, 2003. ARB approved the local SIP element on October 23, 2003, and on January 9, 2004, ARB submitted to the U.S. EPA both the Statewide Strategy and the 2003 South Coast SIP as revisions to the California SIP. The new SIP updates all elements of the approved 1994 SIP and includes additional consumer products measures. Upon approval by U.S. EPA, the 2003 SIP will replace the State's commitments in the 1994 SIP. ARB is currently working with the San Joaquin Valley Unified Air Pollution Control District on a revision to the San Joaquin Valley's ozone SIP. The revised San Joaquin Valley SIP is scheduled for consideration by the District's Governing Board and by ARB later this year.

C. ESTIMATED EMISSIONS FROM CATEGORIES PROPOSED TO BE REGULATED IN 2004 CONSUMER PRODUCTS REGULATION AMENDMENTS

2001 Consumer and Commercial Products Survey

The 2001 Consumer and Commercial Products Survey (2001 Survey) was mailed to over 3,000 companies in September 2002 (Appendix D). The 2001 survey requested data on 48 categories of consumer products. Extensive outreach efforts were made to maximize the market coverage of the 2001 Survey. First, we performed numerous shelf surveys, conducted trade journal and Internet searches and scrutinized results from previous surveys to identify manufacturers and add them to our mailing list. Following the Survey, shelf surveys were again performed, and the list of responding companies was scrutinized by trade associations and survey respondents to identify additional companies which had not responded. Companies that did not initially respond to the survey were contacted, requested to submit the required information, and subsequently, many additional surveys were submitted. The extensive outreach resulted in an estimated 85 to 90 percent market coverage in most categories.

The Survey requested detailed information on the formulations of consumer products, including complete speciation of VOC's, low vapor pressure VOC (LVP-VOC) solvents, and key exempt ingredients, as well as total volumes of inorganic and exempt compounds. Information on sales, product form, customer types, and company size and economics were also requested. Due to the complexity of the data, staff thoroughly reviewed incoming surveys to ensure accuracy prior to entry in the database. When inconsistencies were found, we contacted the survey respondents and made the necessary corrections. Many corrections were made to formulation data to appropriately classify compounds as VOC's, LVP-VOCs, exempt compounds, or inorganic compounds. Prior to entry into the consumer products database, we made every effort to verify and correct the Survey data.

To further ensure the accuracy of the Survey data, we provided extensive summaries to industry detailing the aggregate sales, VOC speciation, VOC tonnage, and other key information. Summary tables were also provided (certain specific data was omitted to protect confidential information), detailing VOC content, product form, LVP-VOC content, and other information. The results of the Survey were discussed at workgroup meetings, and input from industry was used to correct inaccuracies in the data.

To minimize the burden to industry, we developed software to allow manufacturers to submit their surveys electronically. The software aided many manufacturers in reporting large numbers of products and also performed certain data checks automatically. We also developed software to automate calculations of emissions, emission reductions, market coverage and other frequently performed calculations.

Over 400 companies had responded to the Survey by July 2003, reporting over 7,000 products sold in California. The 2001 VOC emissions from the consumer product categories surveyed are estimated to be about 40 tons per day, representing an estimated 15 percent of the total consumer products inventory, on an emissions basis. The focus of the 2001 Survey was primarily on categories that had not previously been regulated and where opportunities for emission reductions were identified. In addition, several categories were surveyed primarily for the purpose of improving the emission inventory or to gain a better understanding of a general category of products. The categories surveyed were widely varied and included products from all general areas of consumer products, however, there was a specific detailed focus on hair care products and solvents. The total VOC emissions from the categories initially proposed for regulation comprised approximately 10.6 tpd statewide in 2001. The information gathered in the 2001 Survey will be used to update the 2001 Air Resources Board emission inventory where appropriate.

Market Coverage Adjustments to the Survey

It is not possible for a survey of this magnitude to reach the entirety of the consumer products industry. Therefore, staff performed shelf surveys to determine the appropriate market coverage adjustment for each category proposed for regulation. Adjustments were made based upon the number of products found on store shelves that were not reported in the Survey. Generally, we found about 8 or 9 out of every 10 products had been reported. Hence, for most categories, the market coverage was estimated to be about 85 to 90 percent.

Some market sectors have historically had a low response rate in previous surveys. For example, in the 1997 Survey effort, it was discovered that automotive windshield washer fluids are frequently produced by small companies which move in and out of the market, so tracking these companies and maintaining a complete mailing list is difficult. For categories where the coverage was determined to be low, adjustments were made by a variety of methods, including previous survey data, bar code data, estimates from industry publications, etc. This additional adjustment was made in only 1 of the 15 categories proposed for regulation.

Adjustments to the inventory to account for the incomplete market coverage inherent in the survey process is not without precedent. The U.S. EPA, in compiling their emissions estimates for their 1990 survey, increased the sales in most categories to account for incomplete market coverage. In addition, the 1994/1995 Mid-term Measures Survey, and the 1997 Survey results were also adjusted. Staff worked with industry members during the development of the 2004 Regulation Amendments to determine the survey coverage, and made adjustments to initially proposed market coverage factors.

Emission Estimates for Categories

The total emissions from the 15 categories proposed for regulation in the 2001 Regulation Amendments is estimated to be 8.5 tons per day in 2001. Table IV-2 summarizes these emissions.

Table IV-2
VOC Emissions by Product Category

Product Category	Product Form	2001 VOC Emissions Adjusted (Tons/Day)
Adhesive Removers:		
Gasket or Thread Locking Adhesive Removers	All	0.031
General Purpose Adhesive Remover	All	0.304
Specialty Adhesive Remover	All	0.460
Floor or Wall Covering Adhesive Remover	All	0.666
Anti-Static Product	Aerosol	0.275
	Non-aerosol	0.000
Contact Adhesive:		
Contact Adhesive-General Purpose	All	0.070
Contact Adhesive-Special Purpose	All	0.075
Electrical Cleaner	All	0.330
Electronic Cleaner	All	0.241
Fabric Refresher	Aerosol	0.424
	Non-Aerosol	0.665
Footware or Leather Care Product	Aerosol	0.050
	Solid	0.174
	All Other Forms	0.094
Graffiti Remover	Aerosol	0.085
	Non-aerosol	0.11
Hair Styling Product	Aerosol*, Pump Spray	0.468
	All Other Forms	0.190
Shaving Gel	All	1.030
Toilet/Urinal Care Product	All Forms*	2.659
Wood Cleaner	Aerosol	0.053
	Non-aerosol	0.226

* To protect confidentiality, emissions have been grouped

Adequate Data

With our estimate of 85-90 percent market coverage for most categories, we feel confident that the Survey had adequate representation of the available technologies in the market place. This assumption has been verified by discussions with manufacturers, category research and the wide range of VOC content reported for products in the categories slated for regulation. Historically for many product categories, the market sector with the lowest coverage is the "private label" sector. The private label market sector does not manufacture products. They purchase products from manufacturers, then put their own brand name on them. Those products generally employ the same technologies as other products made by manufacturers. However, staff believes that because the 2001 Survey had good response from the primary manufacturers, that the survey contained adequate information on most if not all technologies available in the marketplace.

Staff has worked extensively with industry representatives on each category proposed for regulation. In meetings with members of industry, extensive discussions on the types of technologies used in each category were discussed. Numerous product labels and associated literature for each category were analyzed. Category information was also obtained from trade journals, Internet sites, textbooks, and directly from manufacturers.

REFERENCES

Air Resources Board, Staff Report. Effect of Ozone on Vegetation and Possible Alternative Ambient Air Quality Standards. March, 1987. (ARB, 1987)

Air Resources Board, Memorandum. National Exposure to Ozone. From Terry McGuire to Michael H. Scheible. January 6, 1994. (ARB, 1994)

Air Resources Board. Consumer Products Working Group Meeting: A Brief Overview of Photochemical Grid Modeling. October 1996. (ARB, 1996)

Air Resources Board. Letter to Ms. Mary Nichols, United States Environmental Protection Agency. ARB Comments on U.S. EPA Proposals for New, National Clean Air Goals and Policies. March 11, 1997. (ARB, 1997)

Air Resources Board. Final Program Environmental Impact Report Suggested Control Measure for Architectural Coatings, June 2000. (ARB, 2000a)

Air Resources Board and Office of Environmental Health Hazard Assessment. Adequacy of California Ambient Air Quality Standards: Children's Environmental Health Protection Act. December 22, 2000, available at http://www.arb.ca.gov/research/aaqs/caaqs/ad-aaqs/ad-aaqs.htm (ARB, 2000b)

Air Resources Board and Office of Environmental Health Hazard Assessment. Staff Report: Public Hearing to Consider Amendments to the Ambient Air Quality Standards for Particulate Matter and Sulfates, available at http://www.arb.ca.gov/research/aaqs/std-rs/pm-final/pm-final.htm. (ARB, 2002a)

Air Resources Board. 2002 Area Designations and Maps. December 2002, available at http://www.arb.ca.gov/desig/desig02/desig02.htm. (ARB, 2002b)

Air Resources Board. The 2003 California Almanac of Emissions and Air Quality, available at http://www.arb.ca.gov/aqd/almanac/almanac03/toc03.htm. (ARB, 2003),

Atkinson, R. and J. Arey. Atmospheric Chemistry of Gas-phase Polycyclic Aromatic Hydrocarbons: Formation of Atmospheric Mutagens. Environmental Health Perspectives, 102 (Supplement 4), 117-126. (Atkinson and Arey, 1994)

Avol, E.L., W.J. Gauderman, S.M. Tan, S.J. London, and J.M. Peters. Respiratory effects of relocating to areas of differing air pollution levels. Am J Respir Crit Care Med, 164: 2067-2072. (Avol *et al.,* 2001)

Bowman, F.M., Pilinis, C. and Seinfeld, J.H. Ozone and aerosol productivity of reactive organics. Atmospheric Environment, 29, 579-589. (Bowman *et al.,* 1995)

Carter, W.P.L. Documentation of the SAPRC-99 Chemical Mechanism for VOC Reactivity Assessment. Final report to California Air Resources Board, Contract No. 92-329 and No. 95-308. (Carter, 2000)

Finlayson-Pitts, B.J. and J.N. Pitts Jr. Chemistry of the Upper and Lower Atmosphere Chapter 9, Academic Press, New York. (Finlayson-Pitts and Pitts, 2000)

Gauderman, W.J., R. McConnell, F. Gilliland, S. London, D. Thomas, E. Avol, H. Vora, K. Berhane, E.B. Rappaport, F. Lurmann, H.G. Margolis, and J. Peters. Association between Air Pollution and Lung Function Growth in Southern California Children. Am J Respir Crit Care Med, Vol 162, 1383-1390. (Gauderman *et al.,* 2000)

Gauderman, W.J., G.F. Gilliland, H. Vora, E. Avol, D. Stram, R. McConnell, D. Thomas, F. Lurmann, H.G. Margolis, E.B. Rappaport, K. Berhane, and J.M. Peters. Association between Air Pollution and Lung Function Growth in Southern California Children: Results from a second cohort. Am J Respir Crit Care Med, 166: 76-84. (Gauderman *et al.,* 2002)

Gilliland, F.D., K. Berhane, E.B. Rappaport, D.C. Thomas, E. Avol, W.J. Gauderman, S.J. London, H.G. Margolis, R. McConnell, K. Talat Islam, and J.M. Peters. The Effects of Ambient Air Pollution on School Absenteeism Due to Respiratory Illness. Epidemiology, January 2001, Vol 12, No.1, 43-54. (Gilliland *et al.,* 2000)

Godish, Thad. Air Quality. Lewis Publishers, Inc., Chelsea, Michigan, 1991. (Godish, 1991)

Griffin, R.J., Cocker III, D.R., and Seinfeld, J.H. Incremental aerosol reactivity: application to aromatic and biogenic hydrocarbons. Enviorn. Sci. Technol., 33, 2403-2408. (Griffin *et al.,* 1999)

Grosjean, D. *In situ* organic aerosol formation during a smog episode: estimated production and chemical functionality. Atmospheric Environment, 26A, 953-963. (Grosjean, 1992)

Grosjean, D. and J.H. Seinfeld. Parameterization of the Formation Potential of Secondary Organic Aerosols. Atmospheric Environment, 23, 1733-1747. (Grosjean and Seinfeld, 1989)

Harner, T. and Bidleman, T.F. Octanol-air partition coefficient for describing particle/gas partitioning of aromatic compounds in urban air. Environ. Sci. Technol., 32, 1494-1502. (Harner and Bidleman, 1998)

Kleindienst, T.E., Smith, D.F., Li, W., Edney, E.O., Driscoll, D.J., Speer, R.E., and Weathers, W.S. Secondary organic aerosol formation from the oxidation of aromatic hydrocarbons in the presence of dry submicron ammonium sulfate aerosol. Atmos. Enviorn., 33, 3669-3681. (Kleindienst *et al.,* 1999)

McConnell, R., K. Berhane, F. Gilliland, S.J. London, T. Islam, W.J. Gauderman, E. Avol, H.G. Margolis, and J.M. Peters. Asthma in exercising children exposed to ozone: A cohort Study. Lancet, 359:386-391. (McConnell *et al.,* 2002)

McConnell, R., K. Berhane, F.Gilliland, J. Molitor, D. Thomas, F. Lurmann, E. Avol, W.J. Gauderman, and J.M. Peters. Prospective study of air pollution and bronchitic symptoms in children with asthma. Am J Respir Crit Care Med, Vol 168, 790-797 (McConnell *et al.,* 2003)

Moolgavkar, S.H. and Luebeck, E.G. A critical review of the evidence on particulate air pollution and mortality. Epidemiology, 7, 420-428. (Moolgavkar and Leubeck, 1996)

Odum, J.R., T. Hoffmann, F. Bowman, D. Collins, R.C. Flagan, and J.H. Seinfeld. Gas/Particle Partitioning and Secondary Organic Aerosol Yields. *Environmental Science & Technology*, 30, 2580-2585. (Odum *et al.,* 1996)

Odum, J.R., T.W.P. Jungkamp, R.J. Griffin, H.J.L. Forstner, R.C. Flagan, and J.H. Seinfeld. Aromatics, Reformulated Gasoline, and Atmospheric Organic Aerosol Formation. *Environmental Science & Technology,* 31, 1890-1897. (Odum *et al.,* 1997)

Pandis, S.N., R.A. Harley, G.R. Cass, and J.H. Seinfeld. Secondary Organic Aerosol Formation and Transport. Atmospheric Environment, 26A, 2269-2282. (Pandis *et al.,* 1992)

Pankow, J.F. An absorption model of gas/particle partitioning of organic compounds in the atmosphere. Atmospheric Environment, 28, 185-188. (Pankow, 1994a)

Pankow, J.F. An absorption model of the gas/aerosol partitioning involved in the formation of secondary organic aerosol. Atmospheric Environment, 28, 189-193. (Pankow, 1994b)

Peters, J.M., E. Avol, W.J. Gauderman, W.S. Linn, W. Navidi, S.J. London, H. Margolis, E. Rappaport, H. Vora, H. Gong, Jr., and D.C. Thomas. A study of twelve southern California communities with differing levels and types of air pollution. II. Effects on pulmonary function. Am J Respir Crit Care Med, Vol 159: 768-775. (Peters *et al.,* 1999)

Schwartz, J., Dockery, D.W., and Neas, L.M. Is daily mortality associated specifically with fine particles. J. Air Waste Manage. Assoc., 46, 927-939. (Schwartz *et al.,* 1996)

Seinfeld, John H., and Pandis, Spyros N. Atmospheric Chemistry and Physics-From Air Pollution to Climate Change. John Wiley & Sons, New York, 1998. (Seinfeld and Pandis, 1998)

Senate Bill 25, Escutia, Stats. 1999, Ch 731 (Senate Bill 25, Escutia, 1999)

Settlement Agreement, with amendments, in *Coalition for Clean Air, Inc. et al. v. South Coast Air Quality Management District, et al.* (U.S. District Court, Central District of CA, Case No. CV-97-6916 JSL (SHx))

Turpin, B.J. and Huntzicker, J.J. Secondary formation of organic aerosol in the Los Angeles basin: a descriptive analysis of organic and elemental carbon concentrations. Atmospheric Environment, 25A, 207-215. (Turpin and Huntzicker, 1991)

Turpin, B.J. and Huntzicker, J.J. Identification of secondary organic aerosol episodes and quantitation of primary and secondary organic aerosol concentrations during SCAQS. Atmospheric Environment, 29, 3527-3544. (Turpin and Huntzicker,1995)

United States Environmental Protection Agency. Air Quality Criteria for Ozone and Related Photochemical Oxidants. July, 1996, Volume I and III. (U.S. EPA, 1996)

United States Environmental Protection Agency. National Ambient Air Quality Standards for Particulate Matter; Final Rule. Federal Register. July 18, 1997, Volume 62, Number 138, available at http://www.epa.gov/ttncaaa1/t1/fr_notices/pmnaaqs.pdf (U.S. EPA, 1997)

United States Environmental Protection Agency. Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard – Phase 1, Federal Register: 69 23951 (April 30, 2004), available at http://www.epa.gov/ozonedesignations/finalrule.pdf (U.S. EPA, 2004a)

United States Environmental Protection Agency. Air Quality Designations and Classifications for the 8-Hour Ozone National Ambient Air Quality Standards; Early Action Compact Areas with Deferred Effective Dates. Federal Register: April 30, 2004, Volume 69, Number 84, Rules and Regulations, Page 23857-23951, available at http://www.epa.gov/fedrgstr/EPA-AIR/2004/April/Day-30/a9152.htm (U.S. EPA, 2004b)

Wang, S.C., S.E. Paulson, D. Grosjean, R.C. Flagan, and J.H. Seinfeld. Aerosol Formation and Growth in Atmospheric Organic/NO_x Systems-I. Outdoor Smog Chamber Studies of C_7- and C_8-Hydrocabrons. Atmospheric Environment, 26A, 403-420. (Wang *et al.,* 1992)

Yu J., Cocker III, D.R., Griffin, R.J., Flagan, R.C., and Seinfeld, J.H. Gas-Phase Ozone Oxidation of Monoterpenes: Gaseous and Particulate Products. J. Atmos. Chem., 34, 207-258. (Yu *et al.,* 1999)

V.

PROPOSED AMENDMENTS TO THE AEROSOL COATING PRODUCTS, ANTIPERSPIRANTS AND DEODORANTS, AND CONSUMER PRODUCTS REGULATIONS, AND TEST METHOD 310

In this Chapter, we provide a plain English discussion of the proposed amendments to the California Regulation for Reducing Volatile Organic Compound (VOC) Emissions from Consumer Products (the "Consumer Products Regulation"); the California Regulation for Reducing Volatile Organic Compound Emissions from Antiperspirants and Deodorants (the "Antiperspirants and Deodorants Regulation"); Regulation for Reducing Volatile Organic Compound Emissions from Aerosol Coating Products (the "Aerosol Coating Products Regulation"); and amendments to Test Method 310, and explain the rationale for the amendments. In the discussion below, when we refer to the "Regulations," this term applies to the Consumer Products Regulation and the Antiperspirants and Deodorants Regulation.

Where applicable, key terms or concepts involved in each amendment are described. The discussion in this Chapter is intended to satisfy the requirements of Government Code Section 11343.2, which requires that a noncontrolling "plain English" summary of the regulation be made available to the public. The Aerosol Coating Products, Antiperspirants and Deodorants, and Consumer Products Regulations, and the amendments to Test Method 310 are found in Appendix A.

Amendments are being proposed to six Sections in the Consumer Products Regulation, Section 94508 "Definitions;" Section 94509 "Standards for Consumer Products;" Section 94510 "Exemptions;" Section 94512 "Administrative Requirements;" Section 94513 "Reporting Requirements;" and Section 94515 "Test Methods." We are also proposing amendments to Section 94501 "Definitions" and Section 94506 "Test Methods," in the Antiperspirants and Deodorants Regulation. We are also proposing to amend Section 94526, "Test Methods," of the Aerosol Coating Products Regulation. These amendments are discussed below in some detail. No other amendments to the existing Consumer Products Regulation are being proposed and the existing regulatory provisions such as exemptions and test methods will apply to the proposed categories as they apply to the currently regulated product categories.

A few of the more significant existing regulatory provisions that will apply to the 2004 Amendment categories are described briefly. However, for a more detailed discussion of the existing regulatory requirements, the reader is directed to the Phase I and Phase II Technical Support Documents, and the Mid-term Measures Initial Statement of Reasons (ARB, 1990; ARB, 1991; ARB, 1997; ARB, 1999).

Proposed Amendments to the Aerosol Coating Products, the Antiperspirants and Deodorants, and the Consumer Products Regulations

A. DEFINITIONS (SECTION 94508 AND SECTION 94501)

Sections 94501 and 94508, "Definitions," provide all the terms used in the Regulations which are not self-explanatory. The proposed amendments to the Regulations include new or revised definitions to help clarify and enforce the Regulations. In Tables V-1 to V-3 below, we list new definitions proposed for addition pertaining to new product categories proposed for regulation, new definitions to clarify terminology referenced in the Consumer Products Regulation, existing definitions that are proposed for modification to clarify the intent of the definition and to make the definition more enforceable, and lastly we list new definitions that are necessary because they relate to the categories proposed for regulation.

The following list, in Table V-1 comprises proposed new definitions that are needed for newly regulated product categories in the Consumer Products Regulation. Because of the proposed definitional changes, Section 94508(a) would also be reorganized to reflect proper alphabetical order. For all but "Deodorant Body Spray" and "Energized Electrical Cleaners" staff is proposing new VOC limits. Please see Chapter VI, which contains a detailed discussion related to each individual proposed newly regulated category:

Table V-1
New Definitions Proposed for Addition

Anti-Static Product
Contact Adhesive - General Purpose
Contact Adhesives - Special Purpose
Deodorant Body Spray
Electrical Cleaner
Electronic Cleaner
Energized Electrical Cleaner
Fabric Refresher
Floor or Wall Covering Adhesive Remover
Footwear or Leather Care Product
Gasket or Thread Locking Adhesive Remover
General Purpose Adhesive Remover
Graffiti Remover
Hair Styling Product
Shaving Gel
Specialty Adhesive Remover
Toilet/Urinal Care Product
Wood Cleaner

Table V-2, contains the list of existing definitions that are proposed to be modified to improve clarity or because within the definition they relate or refer to newly regulated categories:

Table V-2
Existing Definitions Proposed for Modification

Adhesive Remover	General Purpose Degreaser
Aerosol Product	Hair Shine
Air Freshener	Hair Spray
Bathroom and Tile Cleaner	Hair Styling Gel
Bug and Tar Remover	LVP-VOC
California Sales	Paint Remover or Stripper
Contact Adhesives	Personal Fragrance Product
Dusting Aid	Product Form
Existing Product	Semi-solid
Facial Cleaner or Soap	Shaving Cream
Furniture Maintenance Product	Spot Remover

The third list, Table V-3 below, is proposed definitions needed that relate to the newly proposed categories.

Table V-3
New Definitions Proposed that Relate to New Product Categories

Floor Coating	Pressurized Gas Duster
Paint Thinner	

Although not shown in the Tables above, we are also proposing to modify the "Deodorant" definition in Section 94501 of the Antiperspirant and Deodorant Regulation.

The following narratives address proposed definitional additions or changes that require further explanation.

Aerosol Product

Staff proposes minor changes to the definition of "Aerosol Product". The proposed changes are a clarification and are intended to address the fact that alternative packaging systems such as bag-in–can or piston technologies that result in product delivery similar to conventional aerosols, are included under the aerosol form. Staff does not expect any party subject to the Consumer Products Regulation to be adversely affected by this change.

California Sales

California sales is a term used under the reporting requirements provision in the consumer products regulation to refer to the total pounds of a given product sold in California during a calendar year. In the definition, the obsolete term "registration" is used. Registration used to refer to the process of reporting sales and formulation data.

The term now used to refer to reporting of data is "required information." Therefore, staff has proposed to replace the outdated term "registration" with "required information", to make it consistent with references elsewhere in the Consumer Products Regulation. Staff did not receive any comments relating to this proposed modification and does not expect any party subject to the Consumer Products Regulation to be adversely affected by this change.

Deodorants and Deodorant Body Spray

"Deodorant Body Sprays" are currently categorized as personal fragrance products containing 20 percent or less fragrance. Deodorant Body Sprays are products that are designed to be applied all over the body to provide a scent. However, these products appear to also provide some deodorant protection.

Deodorant Body Sprays designed for women have been available for a number of years and have been marketed and sold as personal fragrance products. Newer to the market are Deodorant Body Sprays designed for men. In the case of the Deodorant Body Sprays for men, the distinction between underarm deodorants, as defined in Section 94501(d) (see the Regulation for Reducing Volatile Organic Compound Emissions from Antiperspirants and Deodorants, title 17, California Code of Regulations, Sections 94500-94506.5), and "Personal Fragrance Products," has been blurred. Staff is concerned about the potential for products labeled as Deodorant Body Sprays to be used as underarm deodorants, leading to erosion of the emission reductions achieved from aerosol deodorants.

Therefore, at this time, staff is proposing to modify the definition of "Deodorant" in Section 94501(d), of the Antiperspirants and Deodorants Regulation and propose a new definition in Section 94508 for "Deodorant Body Spray." The "Deodorant" definition would be modified to specify that a deodorant is any product that indicates on the label that it can be used under the arm to provide a scent or minimize odor. The proposed definition for "Deodorant Body Sprays" would clarify that these products are personal fragrance products, unless the product label indicates or depicts it can be used under the arm. Any Deodorant Body Spray label which indicates or depicts that it is suitable for use in the human axilla would be considered a "Deodorant" as defined in Section 94501(d). Because the proposed modifications to the Deodorant definition may require some products' labels to be modified, staff is also proposing that the definition would not become effective until January 1, 2006.

Staff intends to survey the proposed category "Deodorant Body Spray" to obtain 2003 calendar year formulation and sales data later this year. Staff will use the survey data to determine the most appropriate regulatory strategy. Until such time as an appropriate regulatory strategy is determined, Deodorant Body Sprays will continue to be required to meet a 75 percent by weight VOC limit, equivalent to the limit for "Personal Fragrance Products" containing 20 percent or less by weight fragrance.

Energized Electrical Equipment

As part of this rulemaking, staff is proposing to prohibit the use of three chlorinated solvents-methylene chloride (MeCl), perchloroethylene (Perc), and trichloroethylene (TCE)-in seven additional consumer product categories, including "Electrical Cleaners." The actual staff proposal is further explained later in this Chapter under Section B.

"Electrical Cleaners" are products designed to clean or degrease electrical equipment such as electric motors, armatures, relays, electric panels, or generators. In some instances cleaning or degreasing must be performed while the equipment is operational, i.e., current is in use, or where there is residual current. This is a situation when use of chlorinated solvents may be needed to ensure that the equipment being cleaned does not short out, and that there is no shock, spark, or fire hazard. In these situations staff believes that continued use of chlorinated solvents may be needed.

As such, staff is proposing a new definition for "Energized Electrical Cleaner" to define cleaners that must be used when electrical current is in use, or where there is residual electrical potential. These products, as proposed, would not be subject to the prohibition on the use of Perc, MeCl, or TCE; and would be exempt from compliance with the proposed VOC limit for "Electrical Cleaners" of 45 percent by weight.

To qualify for the exemption, "Energized Electrical Cleaners" would have to include a statement on their product label that clearly states that the product is solely for use on electrical equipment energized with an active or residual power source. This proposal is further explained in Chapter VI.

Hair Care Products

In preparation for the 2001 Consumer and Commercial Products Survey staff performed extensive shelf surveys, internet searches, and analyses of industry publications related to hair care products. Staff found the general category of hair care products to be very confusing and fluid. Often, hair care products are found to make multiple function claims, have non-specific claims, or not provide any claims or instructions at all. Product names are often not intuitive or descriptive of their function or purpose. Existing products are being repackaged or renamed and new products are constantly being brought to the market. Through extensive analysis staff found that products could be generally separated by those that aid in styling, (are placed in the hair before styling), those that "finish," (are applied after styling to maintain the style for a period of time), and those that perform both styling and finishing functions. Because of these issues staff believes it is necessary to redefine and re-analyze the hair care product definitions and VOC limits. Through the proposed definition changes discussed below, staff has attempted to characterize and regulate as many hair care products as possible. See Chapter VI, Section h, for a complete discussion of the justification for new VOC limits affecting hair care products.

Hairspray

The current regulatory definition of Hairspray attempts to capture those products that employ resins to hold, or maintain a hair style. The 2001 survey revealed that there are hair spray products that do not employ a resin. In addition, there are many products that are labeled to be applied to the hair both before and after styling, i.e. used as a styling aid and a finisher. The proposed changes to the hairspray definition attempt to address these issues first by removing the term "resin." This change would include finishing hairsprays in the definition that employ wax or other similar compounds that aid in providing hold to styled hair. In addition, changes are proposed that would make it clear that products that are designed and labeled to be used as both a styling aid and finishing product fall under the definition of hairspray. Further, proposed changes draw a clear distinction between hairspray and hair styling product. While the definition and VOC limit pertaining to Hair Mousse was not significantly affected, staff did thoroughly evaluate those products and similar products and considered them in other hair care sub-category proposals.

Staff received comment that the proposed changes to the hairspray definition would cause previously un-regulated products to now come under regulation. This would cause a situation that would not allow manufacturers adequate time to reformulate products. Further, commentors were concerned that ARB would not perform the proper feasibility analysis that was normally undertaken when setting new limits for categories. We agree that the proposed changes may pull products such as wax-based hairsprays that were previously unregulated into the Consumer Products Regulation, but we do not agree that this raises any legal issues. However, we are proposing that the definition change would not become effective until December 31, 2006, to allow companies whose products do not meet the 55 percent VOC limit time to reformulate. In addition, staff performed several product determinations for hair wax products. In those determinations, we alerted industry that we would likely consider including hair waxes in the definition of hairspray in the next rule amendment. We also had mentioned the intention of including hair waxes in the hair spray definition at several Consumer Product Workgroup Meetings. Further, we have identified several potential reformulation pathways that are based on formulations of aerosol products that comply with the proposed 55 percent VOC limit. However, if reformulation options do not prove to be feasible for wax based hair sprays, then staff believes that these products could simply change from wax based systems to resin based systems. While this in effect would eliminate wax based hair sprays, this situation would not constitute elimination of a product form, because products serving the basic function of a hair spray are still available. Hair spray waxes do not make unique claims or provide functions that resin based hairspray and/or Hair Styling Products do not. Finally, staff believes that many hair waxes may be already be subject to a 55 percent VOC limit under the definition of Hair Shine.

Hair Styling Product

The definition of Hair Styling Gel currently in the Consumer Products Regulation covers a subset of a wide variety of products that perform in a very similar fashion available in the market place. Many of these products are similarly designed, and labeled with instructions to be placed on towel dried hair prior to styling, then the user is instructed to style the hair. The term "gel" is problematic in that the Consumer Products Regulation originally intended to address a specific form that is semi-solid in nature. However, the term "gel" is used by hair care product manufacturers to describe products that may be solid, liquid or semi-solid, and may be packaged in a tube, pump or aerosol can. As stated earlier, the hair care products market is very fluid with products and product labels changing constantly. It is difficult to determine by the label what form a product is. Further, it is difficult to determine from the label or even by direct inspection whether a product is a "gel" or other form. There are dozens of terms used on labels to describe similar products including but not limited to hair balm; clay; cream; crème; curl straightener; detangler; gel; liquid; lotion; paste; pomade; putty; root lifter; serum; spray gel; stick; temporary hair straightener; volumizer; and wax.

Therefore, staff is proposing to modify the definition of Hair Styling Gel to include a broader range of products and include multiple forms. The category is proposed to be renamed "Hair Styling Product" and the VOC limits proposed would be the same for solid, semi-solid, and liquid reflecting the fact that it is often difficult to differentiate form and that there are very low VOC products making very similar claims and containing the same directions for each form.

Low Vapor Pressure – Volatile Organic Compound

Currently, compounds that meet the definition of LVP-VOC are exempt from the definition of VOC. This exemption allows these compounds, which evaporate slowly and thus are less likely to substantially participate in ozone formation, to be used to meet percent by weight VOC limits specified in the Consumer Products Regulation. At present, an LVP-VOC is defined as a compound or mixture having a vapor pressure less than 0.1 mm of Mercury, a boiling point greater than 216 degrees Celsius, or more than 12 carbon atoms.

At issue is whether a manufacturer has undertaken due diligence to determine that the vapor pressure is unknown. To address this, staff is proposing that the definition of LVP-VOC be modified to allow compounds or mixtures to qualify as LVP-VOCs under the more than 12 carbon atom provision only if the vapor pressure *and* boiling point are unknown, and the existence of more than 12 carbon atoms is verified by formulation data. These proposed changes attempt to provide industry and ARB staff more certainty in determining when a compound or mixture qualifies as an LVP-VOC.

Staff received a number of comments opposing initially proposed language. Consequently, staff re-drafted the proposed language and now has received general

support for the latest proposed modified regulatory language. Staff does not expect the proposed modification to the LVP-VOC definition to adversely affect any party subject to the Consumer Products Regulation.

Multi-purpose Solvent

In the 2001 Survey, staff requested information on "Multi-purpose Remover" and "Packaged Solvent." These two survey categories were part of the "Multi-Purpose Solvent" category. Initially, the data revealed that a number of paint thinners, or products suitable to be used as paint thinners, were reported. These products were removed and will be considered when paint thinners are evaluated for Consumer Products Regulation in subsequent rulemakings.

Also included in the category of "Multi-Purpose Solvent," are multi-function products that claim to be suitable for degreasing; laundry pre-wash; removing latex paint drips, spots, stains, adhesives, graffiti, bugs, tar, and more. Almost all of these uses are either currently covered under previously regulated categories, or by categories proposed for regulation in this rulemaking.

Clearly these multi-function products present a regulatory challenge and a potential conflict with implementing the "Most Restrictive Limit" clause contained in Section 94512(a). Staff is concerned about continuing to allow multi-function products that makes claims for uses that are regulated, maintaining a 'level playing field' for all stakeholders, and ensuring that emission reductions already claimed, or being claimed, occur. While we have these concerns, staff believes that further evaluation of these products is prudent. Therefore, we are committing to further investigate the need for these multi-function products, and pending the outcome of that investigation, to determine the best regulatory strategy, in light of the issues raised here.

Product Form (Gel and Semi-solid)

Staff has identified an area of confusion relating to the term "Gel" as it pertains to describing a specific product form. Due to the proliferation of new products using a wide variety of terms to describe products available on the market, gel no longer is used in a manner consistent with the original intent of the Consumer Products Regulation to describe a unique product form. Staff believes that "semi-solid" better describes the product form, as it is intended to be addressed by the Consumer Products Regulation. Staff believes semi-solid is a more appropriate term to address products that are neither solid nor liquid but may be somewhere in between. The term Gel is currently used by marketers to describe a wide variety of product forms which may truly be liquid, semi-solid, solid or even foams and pump sprays.

Therefore staff is proposing to modify the following definitions to address this issue: Facial Cleaner or Soap; Gel; Hair Shine; Product Form; and Semi-solid. In addition, in the Table of Standards, under "Air Fresheners" the limit of 3 percent VOC specified for solids/gels would now read solids/semi-solids. Outside of hair care

products, staff does not believe that these proposed changes would require a significant number of products that are currently unregulated to now be subject to a VOC limit. In terms of hair care products see further discussion under the heading of Hair Care Products below.

Staff received comments that using the above discussed logic, Shaving Gel would need to be changed to Shaving Semi-solid to make the Consumer Products Regulation consistent. Staff disagrees with this comment because Shaving Gel is a specific product category and does not describe a product form of a product category. Shaving Gel is a term used and recognized by industry to describe a specific product.

Further, some interested parties commented that many products that were not previously regulated may now fall in to the Consumer Products Regulation and be subject to VOC limits or other requirements. Commenters assert that pulling new products into the Consumer Products Regulation by changing an existing definition, instead of addressing these products under the Consumer Products Regulation by creating a new category does not constitute a proper technical, commercial and economic analysis to determine if the proposed changes are feasible. We do not agree with this analysis. Staff believes that there may be some hair care products affected by this change but is not aware of any specific product that would be newly regulated. Staff would welcome a list of any such products and will evaluate possible feasibility issues. Product manufacturers may have the mistaken belief that because their product is labeled as a cream, putty, etc., that they are not subject to the gel (semi-solid) form limit specified for a given category. It is not the name, but the physical characteristics of the product that determine the form. We believe that changing the form definition from gel to semi-solid clarifies this point and makes clear which products are subject to regulation. For hair care products, staff has provided a full analysis and justification of the VOC limits set for hair styling products, the proposed definition language including form distinction such as gel or semi-solid, in Chapter VI, Subsection h.

B. STANDARDS FOR CONSUMER PRODUCTS (SECTION 94509)

Table of Standards

The proposed regulatory action would amend the existing consumer products regulation by adding product category definitions and VOC limits for 14 new categories, and by adding more stringent VOC limits for three existing categories. Some of these categories are split into subcategories, or have future effective limits for lower limits, such that a total of 25 VOC limits are proposed. For example, the new "Anti-static Product" category is subcategorized into "aerosols" and "non-aerosols". The new or modified VOC limits would become effective December 31, 2006, December 31, 2008, or December 31, 2009, as indicated in Table V-4 below. These changes would be reflected in the Table of Standards in Section 94509.

Table V-4
Proposed VOC Limit, Product Forms, and Effective Dates

Product Category	Product Form	Proposed VOC Limit (wt%)	Effective Date
Adhesive Removers:			
Floor or Wall Covering Adhesive Remover	All	5	12/31/2006
Gasket or Thread Locking Adhesive Removers	All	50	12/31/2006
General Purpose Adhesive Remover	All	20	12/31/2006
Specialty Adhesive Remover	All	70	12/31/2006
Anti-Static Product	Aerosol	80	12/31/2008
	Non-aerosol	11	12/31/2006
Contact Adhesive:			
Contact Adhesive - General Purpose	All	55	2/31/2006
Contact Adhesive - Special Purpose	All	80	12/31/2006
Electrical Cleaner	All	45	12/31/2006
Electronic Cleaner	All	75	12/31/2006
Fabric Refresher	Aerosol	15	12/31/2006
	Non-aerosol	6	12/31/2006
Footware or Leather Care Product	Aerosol	75	12/31/2006
	Solid	55	12/31/2006
	All Other Forms	15	12/31/2006
Graffiti Remover	Aerosol	50	12/31/2006
	Non-aerosol	30	12/31/2006
Hair Styling Product	Aerosol, Pump Spray	6	12/31/2006
	All Other Forms	2	12/31/2006
Shaving Gel	All	7 4	12/31/2006 12/31/2009
Toilet/Urinal Care Product	Aerosol	10	12/31/2006
	Non-aerosol	3	12/31/2006
Wood Cleaner	Aerosol	17	12/31/2006
	Non-aerosol	4	12/31/2006

Wasp and Hornet Insecticides

The VOC limit specified for Wasp and Hornet Insecticides currently appears at the end of the table of standards, separate from other insecticide standards. Staff is proposing to move the citation of the VOC limit under the general heading of insecticides, so that it would appear with the rest of the insecticide categories. Staff

believes that this change is necessary for clarification and ease of finding the limit. Staff did not receive any opposition to this change from interested parties and believes that this change would not adversely affect any party subject to the Consumer Products Regulation.

Shaving Gel

As shown in the Table V-4 above, in addition to the proposed 7 percent VOC limit for Shaving Gel, effective December 31, 2006, we are proposing a future effective VOC limit for Shaving Gel products. The proposed future limit is 4 percent by weight, effective December 31, 2009. Staff believes that this limit is feasible, if more time is given to achieve this challenging VOC limit. However, the proposed two tiered limit is designed to achieve what staff believes to be the maximum feasible reduction from Shaving Gel products at this time. Because of the challenge, however, should the Board adopt the staff's proposal, within the Resolution adopting the amendments, staff would commit to a formal technical and cost assessment of the technological feasibility of the 4 percent limit no later than January 1, 2009.

Other Subsections of Section 94509

The following changes are those that pertain to Subsections of section 94509 separate from the Table of Standards.

Dilutable Automotive Windshield Washer Fluids

Staff is proposing to modify Section 94509(b) to allow manufacturers of dilutable automotive windshield washer fluids to specify multiple dilution instructions on the label. The Consumer Products Regulation specifies different VOC limits in different areas of California for Automotive Windshield Washer Fluids: 35 percent VOC by weight for Type A areas, and one percent VOC for non-Type A areas. The Consumer Products Regulation currently specifies this bifurcation of the VOC limit recognizing that in Type A areas, (those mountainous areas subject to low winter temperatures), more VOC is needed to protect the washer fluid and associated equipment from freezing.

Further, the Consumer Products Regulation currently considers the dilution instructions found anywhere on the label that result in the minimum dilution, (those resulting in the highest VOC content), in determining the product's VOC content for the purpose of complying with the specified limits. Because of this, if a manufacturer chooses to market one product intended for both Type A areas and non-Type A areas, and includes dilution instructions specific to each area, the product would not comply with VOC limits specified for non-Type A areas.

Therefore, staff is attempting to correct this situation by allowing multiple dilution instructions to be considered for Automotive Windshield Washer Fluids. Because limits for different areas of California are specific to automotive windshield washer fluid, no other products will be offered a similar allowance. The proposed amendments to the

Consumer Products Regulation would require that products intended for both Type A areas and non-Type A areas specify the dilution instructions for each area. Further, for the purposes of determining compliance with the applicable VOC limit, the proposed amendments would consider the VOC content after the specified dilution has taken place for either Type A or non-Type A areas respectively.

Staff has received support from interested parties on this proposed change to the Consumer Products Regulation. Staff does not believe that these proposed modifications would adversely affect any party subject to the Consumer Products Regulation. Rather it is anticipated that these amendments would be beneficial to manufacturers of dilutable automotive windshield washer fluids.

Sell-through of Products (Notification of Sell Through), Section 94509(c)

A written notification provision is proposed for Section 94509(c), that would add a requirement that any person who sells or supplies regulated consumer products during the 3-year sell-through period, must notify the purchaser of the product in writing of the date on which the sell-through period for that product will end. However, this notification is required only if the product is sold or supplied to a distributor or retailer within the last six months of the sell-through period and does not comply with the lowest applicable VOC limit.

The written notification requirement is proposed because we have continued to observe older non-compliant products on the shelves long after the three-year sell-through period is over. Enforcement investigations have found cases where the products were sold to retailers close to the end of the sell-through period without the retailer being informed that they had a limited time to legally sell the product. This leaves the retailer burdened with non-complying products and since most retailers cannot determine if products comply, non-compliant products continue to be sold in California. In other cases, manufacturers have not been able to substantiate that they have notified their distributors and retailers that certain products should no longer be sold in California. While we encourage manufacturers to inform distributors and retailers throughout the sell-through period, this provision should ensure that buyers who are not aware of our regulation will have prior knowledge that specific products must not be sold in California after the expiration of the applicable sell-through dates. This provision should not place an undue administrative burden on most companies because the majority of products are sold well before the final six months of the sell-through period, and many companies who do sell products within the final six months already notify their purchasers about the end of the sell through period.

In addition, staff added a Subsection (c) to Section 94509(c)(1) to clarify that the sell through provision for solid Air Fresheners and Toilet/Urinal Care Products containing para-dichlorobenzene is not three years, rather it is one year per Subsection (o) of Section 94509.

Requirements for Aerosol Adhesives

Staff proposes a minor correction to Section 94509(i)(1) related to additional requirements for aerosol adhesives. This correction would address an inconsistency in the Consumer Products Regulation's language which does not allow complying aerosol adhesives to be used under certain circumstances. The Consumer Products Regulation allows any product with a VOC content above an applicable VOC limit, manufactured prior to the effective date of that limit, to be sold for up to three years after the effective date (Sell-through provision). The current language of Subsection 94509(i)(1) prohibits the use of any aerosol adhesive that exceeds an applicable VOC standard. It was not the intent to prohibit *use* of any product after sale if the product was legally sold prior to or during the sell-through period. The sell through period for aerosol adhesives expires on January 1, 2005.

The second sentence of this provision addresses exceptions to the use of aerosol adhesives that contain VOCs in excess of an applicable standard. Therefore staff proposes adding a citation to Section 94509(c) Sell-through of products, prior to the citation of Section 94510 in the second sentence of the Subsection to correct this error. Staff does not believe that this change will adversely impact any party affected by the Consumer Products Regulation. In addition, staff has not received any comment opposing this change.

Prohibition of Chlorinated Solvents for Specific Categories

To mitigate a potential adverse environmental impact staff is proposing a new subjection (j) within Section 94509 to prohibit the use of the Toxic Air Contaminants methylene chloride, perchloroethylene, and trichloroethylene in Adhesive Removers, Contact Adhesives, Electrical Cleaners, Electronic Cleaners, Footwear or Leather Care Product, General Purpose Degreasers, and Graffiti Removers. As documented in Chapter IX, Environmental Impacts, staff has determined that implementing the VOC limits for these categories could lead to increased use of these three chlorinated solvents. As discussed in Chapter IX, continued use, or increased use of methylene chloride, perchloroethylene, and trichloroethylene, could potentially result in increased cancer cases.

Staff finds that the prohibition is technologically and commercially feasible because in each category, alternative products are available that do not use methylene chloride, perchloroethylene, and/or trichloroethylene. VOC limits are also proposed that can be achieved without using the exempt VOC solvents perchloroethylene or methylene chloride (trichloroethylene is considered a VOC). This proposal is consistent with prior action of the ARB to prohibit the use of methylene chloride, perchloroethylene, and trichloroethylene in aerosol adhesives, certain automotive maintenance products, and aerosol coatings.

The prohibition on chlorinated solvents is being proposed as a mitigation measure under the California Environmental Quality Act (Public Resources Code

Section 2100 et seq.) An alternative basis for the prohibition, however, is the authority granted the ARB to control toxic air contaminants (TACs) under Health and Safety Code Section 39665 et seq. Chapter VII of this Initial Statement of Reasons contains a description of the California's TAC identification and control program. The "needs assessment" report for the prohibition on chlorinated solvents, as specified in Health and Safety Code Section 39665, can be found in Chapter IX of this Initial Statement of Reasons.

C. EXEMPTIONS (Section 94510)

Exemption for products containing at least 98 percent para-dichlorobenzene

We propose to modify Subsection (g) to remove the reference to air fresheners appearing under the exemption of products containing at least 98 percent para-dichlorobenzene. This change is necessary implement staff's proposal to prohibit the use of para-dichlorobenzene in air fresheners. Please see the discussion of the technical justification for this change in Chapter VI, Section H, and Chapter VII. The exemption for insecticides containing at least 98 percent para-dichlorobenzene will remain.

D. ADMINISTRATIVE REQUIREMENTS (SECTION 94512)

Most Restrictive Limit

The current most restrictive limit provision applies only to representations made on the principal display panel of the product. Staff proposes that for products manufactured on or after January 1, 2007, representations made anywhere on the label, packaging, and all affixed labels or stickers be used to determine the applicable VOC limit for that product. This proposed language is consistent with a similar provision in the Aerosol Coating Products Regulation.

At the time the most restrictive limit provision was modified in 1991 to only include the principal display panel, we believed that it would not result in circumvention of the regulation. However, in recent enforcement investigations, products have been found where representations on the principal display panel were inconsistent with representations on the rest of the label or packaging. We have investigated cases where labels have appeared to have been changed to avoid reformulation to meet VOC limits. Principal display panels have made claims that the products are best described under an unregulated product category, but other claims and usage instructions on the container represent that the product is suitable for use as a regulated product. In order to level the playing field for products that comply with the VOC limits, we believe that all of the characterizations made by the company on the container and packaging should be used to determine the VOC limit, not just the principal display panel. This provision does not prevent multi-function products from being marketed, but only requires that they meet the lowest applicable VOC content based on the claims the manufacturer chooses to make on the label. These changes are being made to ensure that the

integrity of this regulation is maintained and that quantified emission reductions occur. The effective date of this change is proposed to be January 1, 2007, so that manufacturers have ample lead time to review their current labels and take appropriate action to insure that their products comply with the applicable standard.

Product Dating

Under the current language of the Consumer Products Regulation, products are required to clearly display the date of manufacture or a code indicating the date on all containers. We propose to make several changes to the provisions relating to these date codes in Section 94512(b) and 94512(c) that would become effective for products made after January 1, 2006.

In Section 94512(b), we are proposing to require that companies use either the date of manufacture, a specified code, or annually provide an explanation of the code designating the date of manufacture. In addition, an updated explanation would need to be provided any time a code-date is changed. A provision will also be added that the date or code-date must be displayed on the product container such that it is readily observable without removing or disassembling any portion of the product container or packaging. This language is consistent with the Administrative Requirements in Section 94524(b) of the Aerosol Coating Products Regulation. Additional changes will be made to Subsection (b)(3) for clarity and to Subsection (b)(5) to renumber the section to make it consistent with the above changes.

Additional provisions are proposed for Section 94512(c), "Additional Product Dating Requirements". Staff has proposed that manufacturers update their date code explanations on an annual basis starting in January 2006 unless they use the specified code. Any time a company changes their date code, it will be required to file a revised explanation prior to the product being sold in California with the revised code. Subsection (c)(3) will be added for clarity and consistency with the other consumer products regulations.

In addition, Subsection (c)(4) will be added to specify that codes indicating the date of manufacture are public information and may not be claimed as confidential. This change is consistent with a decision reached in a lawsuit filed against the ARB on October 11, 2002: *Pro's Choice Beauty Care, Inc. v. California Air Resources Board* (Sacramento County Superior Court, Case No. 02CS01580). In this case, a consumer products distributor requested the ARB to disclose the date-code explanations filed with the ARB by a number of consumer products manufacturers. Some of these manufacturers did not claim any confidentiality protection for this information, but other manufacturers requested that their date code explanations be protected as confidential trade secrets. The ARB initially agreed with the manufacturers claiming confidentiality protection and refused to disclose the information. Pro's Choice then sued the ARB under the California Public Records Act, asserting that the explanations were not entitled to confidential treatment.

The Court agreed with Pro's Choice. In an October 14, 2003 decision, Judge Lloyd Connelly held that date code explanations are not trade secrets and are not entitled to confidentiality protection under the California Public Records Act. The Court ordered the ARB to disclose the requested explanations to Pro's Choice, and the ARB did so. After due consideration of the Court's reasoning and the information learned during the briefing process for the lawsuit, staff believes that this case was correctly decided. Staff is therefore proposing to amend the consumer products regulation to provide that date-code explanations are public information, thereby providing notice to manufacturers that this information will be provided in the future to anyone who requests it.

Due to company mergers, brand ownership changes, change in fillers or manufacturers, code-dates become obsolete and the explanations filed with the Board are not updated. Often, records are not passed on to new companies or manufacturers, therefore making it nearly impossible to determine dates of manufacture. Some contract fillers use their own codes that do not match the explanations of the codes provided by the responsible party. Some manufactures make minor changes to codes that make them undecipherable. Maintaining accurate date code explanations are time intensive for manufacturers and ARB enforcement staff. In addition, distributors and retailers cannot identify what product to pull at the end of sell-through periods or during recalls. Initial proposals were considered to eliminate date codes or to allow a limited number of date codes that could be deciphered without an explanation. However, manufacturers expressed serious concerns about consumer confusion over "open" date codes and identified that the cost to change over to a limited number of codes would be significant.

Code dates that are not easily identified or observable are an ineffective enforcement tool in the field and result in unnecessary sampling and laboratory analysis, especially for products that are sold during the sell-through period. The changes made to Subsection 94512(b) will facilitate enforcement efforts while providing options to industry to ensure that the date of manufacture can be determined to prevent non-compliant products from being sold in California. However, it must be understood that companies that do not comply with the date code requirements will be subject to enforcement action.

Additional Labeling Requirements for Adhesive Removers, Aerosol Adhesives, Contact Adhesives, Electrical Cleaners, and Electronic Cleaners

Staff is proposing modifications to Section 94512(d) that would require certain product categories to place additional information on their labels to identify the appropriate product category and VOC limit for the category. Under the staff's proposal, Adhesive Removers, Contact Adhesives, and Electronic and Electrical Cleaners would be required to include the applicable product category, as defined in Section 94508, and the VOC limit for that category somewhere on the product's container. An abbreviation of the product category would also be acceptable to identify the product category,

however, the explanation of the abbreviation would be filed with the Executive Officer. Currently, these labeling requirements only apply to aerosol adhesives.

These labeling requirements are being proposed for Adhesive Removers, Contact Adhesives, and Electronic and Electrical Cleaners because it is not always evident from the product label what the appropriate subcategory would be. The proposal is also designed to aid in enforcement of the Consumer Products Regulation.

E. REPORTING REQUIREMENTS (SECTION 94513)

Reporting Requirements, Subsection (a)

Several revisions are proposed that relate to reporting requirements. As was discussed earlier in this Chapter, the definition of California Sales was modified to remove the obsolete term "registration' and replace it with "required information." Subsections (a) (8) and (b) of Section 94513 were also modified in this manner. These proposed modifications address the fact that formulation and sales data is no longer obtained through a "registration" process, rather is obtained through the survey process. Per the regulation, the survey (request for information) is the vehicle whereby data requested by the Executive Officer necessary to set limits in the regulation is obtained. A similar request for data had been previously referred to as "registration", but no longer applies in this context.

Other revisions to Section 94513 are proposed to address the fact that during the 2001 survey, there was confusion as to who is required to submit requested information. Several companies refused to submit required information on behalf, or at the request of "responsible parties". As an example, in some cases companies holding ingredient information (formulators) did not wish to share ingredient information with the responsible party, and they were not willing to provide ARB staff with this information. Even though it is stated specifically in state law (Sections 91100 and 94513, Title 17, of the California Code of Regulations) that ARB can require any holder of necessary information to determine emissions to submit the information upon request, it is not expressly stated within the Consumer Products Regulation. In these cases where formulators refused to supply formulation data, several responsible parties contended that if the regulation had specifically required that the formulator submit the information, it would have made it clear, and the formulator may have felt obligated to report the needed information.

The reporting requirements provision is proposed to be modified to clarify that any company or other person that holds information that is needed to complete a survey is required to submit the information when requested to do so by ARB. While these requirements to provide information upon request can be found elsewhere in state law, staff believes the changes are necessary for clarification, and eliminate the need to refer to requirements found elsewhere in state law.

We believe the proposed modifications discussed above address the issues of concern. Further we have determined that the proposed modified language does not impose any new requirements or costs on any individual or business, rather the changes simply clarify what is already required by state law. While it is not specifically addressed in the Consumer Products Regulation, Section 91100, Title 17, of the California Code of Regulations authorizes the ARB Executive Officer to require the submission of information needed by the Board to estimate atmospheric emissions and to carry out its other statutory duties. (See also Health and Safety Code Sections 39600, 39601, and 41511)

Staff has received comment from interested parties which state that the initially proposed language changes would result in sweeping new authority to ARB to require a wide variety of parties to report. Staff disagrees with this comment, but has modified the proposed language to clarify that parties other than the responsible party may only be required to report upon ARB request if the responsible party does not report or have or did not provide the specific information. Either way, adding the proposed language to the Consumer Products regulation simply repeats what is already required under State law, as discussed above.

Special Reporting Requirements for Consumer Products that Contain Perchloroethylene or Methylene Chloride, Subsection (e)

Currently, consumer products that contain methylene chloride or perchloroethylene are required to annually report the amount of these TACs used. These requirements have applied to categories subject to Section 94509.

We are proposing to also require that "Energized Electrical Cleaners," must report annually on the amount of methylene chloride or perchloroethylene used. This distinction is being made because we are proposing an exemption for use of methylene chloride and perchloroethylene (also trichloroethylene) in Energized Electrical Cleaners, such that these cleaners are not subject to the limits in Section 94509. While we believe the exemption for these products, that must be used while equipment is running, is necessary, we also believe it is prudent to track the use of these chlorinated TACs in these products.

F. AMENDMENT TO TEST METHOD 310, AND TEST METHODS SECTIONS 94506, 94515, AND 94526

We are proposing several changes to Test Method 310, one change to the Test Methods sections of the Consumer Products Regulation, the Antiperspirants and Deodorants Regulation, and the Aerosol Coating Products Regulation.

First of all, within Method 310, revisions to Appendix A of Test Method 310 would delete language that is no longer necessary from a previous version of Test Method 310. Additional proposed revisions to Appendix A include adding language, which will update procedures used to conduct Test Method 310 analyses.

Staff also proposes minor changes to Sections 2, 3, 4, 5 and Appendix B of Test Method 310 to reflect the re-certification of American Society of Testing and Measurement methods previously incorporated by reference.

In addition, staff proposes adding language to Section 4 of Test Method 310, which will clarify the calculation used in determining the percent VOC of Consumer Product Samples containing LVP-VOC compounds and/or mixtures.

We also propose updating Figures 1, 2 & 3 of Test Method 310. These updates will reflect the most recent specifications for the Metal Aerosol Container Propellant Collection System, Metal Aerosol Container Sample Venting Platform and Glass Aerosol Container Propellant Collection System. Staff also proposes adding Figure 4, which will include specifications for the Glass Aerosol Container Sample Venting Platform.

Within the Test Methods sections of the Consumer Products Regulation, the Antiperspirants and Deodorants Regulation, and the Aerosol Coating Products Regulation, we are proposing to update the date on which Test Method 310 was last amended. Because Test Method 310 is proposed for amendment in this rulemaking, within the "Test Method" sections a placeholder for the new effective date for Test Method 310 is provided. Additionally, within the Aerosol Coating Products Regulation, staff is proposing to update the Acid Content method used to determine Acid Content in rust converters. This would be reflected, by a new date in Section 94526(f).

REFERENCES

Air Resources Board, Technical Support Document. Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation. June 6, 1997. *("Mid-term Measures I")*. (ARB, 1997)

Air Resources Board, Technical Support Document. Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation. September 10, 1999. *("Mid-term Measures II")*. (ARB, 1999)

Air Resources Board, Technical Support Document. Proposed Amendments to the Statewide Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products - Phase II. October, 1991. (ARB, 1991)

Air Resources Board, Technical Support Document. Proposed Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products. August, 1990. (ARB, 1990)

Judgement and Order filed October 14, 2003, in *Pro's Choice Beauty Care, Inc. v. California Air Resources Board* (Sacramento County Superior Court, Case No. 02CS01580).

VI.

DESCRIPTION OF PRODUCT CATEGORIES

In this Chapter, we provide for each of the 2004 Amendments product categories: 1) a product category description; 2) information on product use and marketing; 3) information on the product formulations; 4) a discussion of the proposed volatile organic compound (VOC) limit, our rationale for the proposed limit, and the options for compliance; and 5) if applicable, a discussion of the issues associated with the proposed VOC limit, as raised by some of the affected industry. The product categories are in alphabetical order.

A. Adhesive Removers

Product Category Description:

Adhesive Removers are products developed to remove or clean adhesive and adhesive residue of varying compositions from a variety of surfaces using combinations of solubility, swelling, and softening properties. For the purposes of this category, the term "Adhesive," as defined below, includes glues, and sealants. These terms are commonly used interchangeably.

By simple definition, products labeled as "Adhesive Remover," generically imply removal of multiple adhesive types. We used a very broad approach in surveying this category for the purpose of capturing the range of products used to remove adhesives. Recognizing the special requirements for different adhesive applications, with assistance of industry, staff subcategorized based on product use. Survey data paralleled this suggestion, indicating the appropriateness and need for subcategorization.

To understand the "Adhesive Remover" category, it is important to describe the various adhesives these products remove. An "adhesive" is a fluid or semi-fluid material consisting of one or more tackifying polymers and/or resins [resin] dissolved in a variety of solvents for the purpose of forming a physical bond between two materials. The dissolved resin is called the adhesive, and forms a physical bond when the solvents evaporate. Some adhesives require a second component (called a hardener) in order to form a secure bond. Adhesives requiring a hardener form physically reactive bonds between two materials. Some reactive adhesives come in two-part mixes, like epoxies or two-part acrylics, requiring the hardener to be mixed with the adhesive before bonding. Other reactive adhesives may use moisture, anaerobic conditions, UV light, or heat as the hardener. Examples of these adhesives, which do not require mixing, include silicones, urethanes, and some acrylics.

Adhesive technology is continually evolving. Today, however, hybridized adhesive systems that incorporate evaporative and reactive adhesive technologies are becoming more common. It should be noted that there are also "hotmelt" adhesives

available. Adhesives such as these are not unlike the common household "gluestick." Hotmelt adhesives are 100 percent solids, heated past their melting point, and applied in their molten state.

Using survey data, product labels, and assistance from manufacturers and industry associations, four product subcategories were identified within the "Adhesive Remover" category. The identified subcategories of "Adhesive Removers" are: "Floor or Wall Covering Adhesive Remover," "General Purpose Adhesive Remover," "Specialty Adhesive Remover," and "Gasket or Thread Locking Adhesive Remover." Adhesive remover products that remove adhesives intended for use on humans or animals are not included in the "Adhesive Remover" categories. Examples of adhesive removers used on humans or animals include those products to remove adhesives used in the medical or dental field, athletic adhesives, or adhesives associated with nail care.

Product Subcategory Description:

"Floor or Wall Covering Adhesive Remover" are products used to remove floor or wall coverings and the associated adhesive. "General Purpose Adhesive Removers" are products that remove cyanoacrylate adhesives as well as non-reactive adhesives such as hotmelt glues, thermoplastic adhesives, pressure sensitive adhesives, stickers, labels, stencils, et cetera. Non-reactive adhesives bond because of solvent evaporation. "Specialty Adhesive Remover" are products that remove reactive adhesives that are not regulated as "Floor or Wall Covering Adhesive Removers," "General Purpose Adhesive Remover," or "Gasket or Thread Locking Adhesive Remover." Finally, "Gasket or Thread Locking Adhesive Removers" are products used to remove gaskets or thread locking adhesives.

Table VI-1 below, summarizes sales and emissions from "Adhesive Removers," based on the results of the ARB's 2001 Consumer and Commercial Products Survey (ARB, 2001). As shown in Table VI-1, "Floor or Wall Covering Adhesive Remover" are one of the larger emission sources within this category, with estimated VOC emissions of about 0.666 tons per day or (*1,332* pounds per day) in California.

Table VI-1
Adhesive Removers*

Product Subcategory	Number of Products/ Product Groups	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Floor or Wall Covering Adhesive Remover	28	6132	1332
General Adhesive Remover	43	756	608
Specialty Adhesive Remover	19	974	920
Gasket or Thread Locking Adhesive Remover	15	198	62

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for adhesive remover products was 15%; staff believes the 2001 Survey covered 85% of the market.

Table VI-1(a) below, summarizes reactivity data from "Adhesive Removers," based on the results of the ARB's 2001 Consumer and Commercial Products Survey (ARB, 2001). As shown in Table VI-1(a), the larger total ozone forming potential comes from products in the "Specialty Adhesive Remover" subcategory, with estimated total ozone forming potential of about 2.152 tons per day in California.

Table V1-1a
Adhesive Removers*

Product Subcategory	Total Ozone Forming Potential (tpd)	Sales Weighted Average MIR (lbs ozone / lbs product)**
Floor or Wall Covering Adhesive Remover	0.843	0.275
General Adhesive Remover	0.865	2.288
Specialty Adhesive Remover	2.152	4.418
Gasket or Thread Locking Adhesive Remover	0.050	0.513

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for adhesive remover products was 15%; staff believes the 2001 Survey covered 85% of the market.

Product Use and Marketing:

Adhesive removers are utilized by many types of consumers for a variety of adhesive removal needs. These products are sold in a variety of sales outlets including hardware stores and wholesalers; home centers; paint stores; hobby and craft stores; supermarkets and other grocery stores; automotive parts and accessories stores; and by mass merchandisers. Adhesive removers are also sold to industrial or institutional users through distributors or through direct sales by the manufacturer.

Floor or Wall Covering Adhesive Removers are products used to remove floor or wall coverings and the associated adhesive. Floor or wall coverings are indoor or outdoor, non-structural, decorative finishing materials, including counter top finishes. Floor or wall covering adhesive removers are formulated using both VOC and non-VOC technologies, including chlorinated solvents such as methylene chloride. These products may be marketed for multipurpose or specialty uses. Examples of how these products are labeled include: adhesive remover or cleaner for: mastic; carpet and glues; wet and cured urethane flooring adhesive; wallpaper; acrylic; cutback; latex; tiles; cove base; or sealer and adhesive remover.

Directions for product use vary by application. Many products recommend removing as much of the decorative covering as possible before applying the adhesive remover. To remove adhesive beneath porous coverings like wallpaper or carpet, directions suggest application by spraying or pouring the remover onto the covering. For semi or non-porous coverings like wood flooring or tiles, directions recommend saturating the covering with remover and allowing it to soak in and soften the adhesive. For tiles, holes may need to be drilled into the covering to allow for remover penetration. Difficult to remove coverings may require the surface be covered with foil for better results. After a recommended period of time, the surface is scraped using a floor or razor scraper to remove adhesive or covering residue. Typically the product is reapplied, and agitated using a bristled broom or floor scrubber to further soften or liquefy the adhesive. A large scraper or shovel is used to pry the covering from the substrate (if not previously removed), or to scrape the adhesive for removal. The final step is a wash and rinse of the surface.

General Purpose Adhesive Removers, as touched upon earlier, are typically products that remove non-reactive adhesives such as hotmelt glues; thermoplastic adhesives; pressure sensitive adhesives; resin cements; dextrine or starch-based adhesives; rubber or latex-based adhesives; as well as products that remove paper related items including stickers; labels; stencils; or similar adhesives (ARB, 2001), (Glue).

Although cyanoacrylate adhesives are technically "reactive," survey data (ARB, 2001) as well as industry consensus, suggest that most cyanoacrylate adhesives can be removed using acetone. We included cyanoacrylate adhesive removers in this subcategory because many consumers consider "super glues" to be a general purpose adhesive.

Many products in this category are used to remove pressure sensitive adhesives commonly used for stickers; labels; decals; et cetera because they adhere to most surfaces with very slight pressure. Pressure sensitive adhesives are available in solvent and emulsion based forms. Pressure sensitive adhesives are often based on non-reactive rubber adhesives, acrylics, or polyurethanes (ARB, 2001). Pressure sensitive adhesives form viscoelastic bonds that are aggressively and permanently tacky; adhere without the need of more than a finger or hand pressure; and require no activation by water, solvent or heat. Pressure sensitive adhesives are available in a wide variety of resin systems and bond strengths (Global).

Adhesive removers in this subcategory are sold in both aerosol and non-aerosol forms and typically are high in VOC content. Products may be sprayed; poured; or applied with a cloth to remove the adhesive. In addition to dissolving the adhesive, some products may be formulated to swell and soften the adhesive. Products in this subcategory recommend that the dissolved or soft adhesive is scraped away with a spatula or putty knife, and wiped clean with a damp or dry cloth.

Specialty Adhesive Removers are products that remove reactive adhesives such as epoxies; acrylics; adhesive vinyl welds; urethanes; silicones; or structural adhesives and sealants. Reactive adhesives usually require two components, and often require the two components to be mixed together to form a polymerized (crosslinked) structure. A typical two component system involves an adhesive polymer or resin (part A) and a hardener or catalyst (part B). Mixing part A with part B initiates a chemical reaction that produces a very strong bond, as is the case with an epoxy. As mentioned previously, not all reactive adhesives require mixing. Some reactive adhesives are formulated such that the crosslinking may be initiated through exposure to an external element such as moisture; ultra violet light; heat; or anaerobic conditions. Urethane adhesives are an example of non-mixed, reactive adhesives because they react with moisture to form a polymerized structure.

Many believe that reactive adhesives are more difficult to remove than non-reactive adhesives. However, as noted with cyanoacrylate adhesives, this is not always the case. Nevertheless, reactive adhesive removers may require a combination of solvents to dissolve and untangle adhesive bonds, as well as ingredients that swell and soften the adhesive. Swelling the adhesive enlarges the openings in the polymeric resin, allowing smaller, penetrating solvents to maneuver between the bonds, softening and lifting the adhesive from the substrate. The adhesive is scraped away with a spatula or putty knife, and the surface is wiped clean with a damp cloth and allowed to dry. Directions may also recommend more than one application for removal of difficult adhesives.

"Gasket or Thread Locking Adhesive Removers" are excluded from the "Specialty Adhesive Remover" subcategory.

Gasket or Thread Locking Adhesive Removers are products used to remove gaskets or thread locking adhesives. Gaskets are materials located between two

flanges clamped together to ensure the integrity of the seal. They can be made from many different materials, including silicone, which is well-known in the marketplace. Many silicone gaskets are moisture cured – they react with moisture in the air or in the substrates to form a cured polymer layer with high strength. Thread locking adhesives are anaerobic adhesives that cure to form a solid polymer in the absence of oxygen. These types of adhesives are commonly used to adhere metal parts.

Gasket removers are products applied to remove gasket seals from flat or semi-flat metal parts, while thread locking adhesive removers are used to remove seals used to join cylindrical metal parts, (ie. shafts, bolts, etc.). Products in this subcategory typically perform both functions and are generically marketed as "gasket removers." Because many products in this subcategory contain varying amounts of methylene chloride, it is common for products to advertise paint removal claims on the labels. Products with paint removal claims may be marketed as "paint & gasket remover," or display graphics on the label indicating suitable for use for paint removal. Products that suggest suitable use for removing gaskets or thread locking adhesives and paint removal would be included in this subcategory; and subject to the proposed prohibition of chlorinated solvents.

Although survey data exist for only aerosol products, we are also aware of the existence of foaming products. The pressure and force from the aerosol provides a penetrative quality that aids in the swelling and softening of the adhesive. Once sprayed, the product is allowed to sit for 5-10 minutes, then are scraped off with a putty knife or spatula for the removal of gaskets. Once the product softens the threadlocking adhesive on cylindrical parts, the bolt, etc., can be loosened. For difficult to remove adhesive, more than one application may be required. Once the adhesive has been removed, these products suggest that the parts be thoroughly cleaned with a water rinse or damp cloth, and dried before assembly.

It should be mentioned that we are aware that many gasket or thread locking adhesives are "reactive," and form polymerized bonds. For this reason, some may believe that these products belong in the "Specialty Adhesive Remover" subcategory, therefore subject to the 70 percent VOC limit. We believe that products that remove gaskets or thread locking adhesives do not require a higher VOC limit than what we are proposing. Products in this category remove all types of gaskets, including gaskets that are not reactive, such as preformed gaskets made from cork, cardboard, or rubber. Products in this category also contain solvents such as methylene chloride, and are intended to only "soften" the adhesive enough allowing for the adhesive to be mechanically scraped away. On the other hand, products in the "Specialty Adhesive Remover" may be used on more sensitive substrates where mechanical scraping may harm the substrate, especially if the substrate is painted.

Product Formulation:

Adhesive removers are formulated in both aerosol and non-aerosol forms, and can be based upon VOC or non-VOC technologies. There are hundreds of types of

adhesives being manufactured and there are just as many products available to remove the adhesives. Below, are examples of common ingredients found in each of the four adhesive remover subcategories.

Floor or Wall Covering Adhesive Remover

Products in this subcategory are formulated using both VOC and non-VOC technology. Hydrocarbon propellants are used for aerosol removers. Low VOC products achieve adhesive removal by formulating with methylene chloride, dibasic esters, soy methyl esters, LVP-glycol ethers, water, and inorganic or surfactant ingredients. Higher VOC products use hydrocarbon solvents, 2-butoxyethanol, d'limonene, and glycol ethers (ARB, 2001).

General Purpose Adhesive Remover

Products in this subcategory are formulated using VOC technology, although there is limited use of LVP-VOC and exempt ingredients such as dibasic esters and acetone. Typical ingredients found in this subcategory include hydrocarbon solvents, d'limonene, isopropyl alcohol, 2-butoxyethanol, xylenes, glycol ethers, and hydrocarbon propellants for aerosols (ARB, 2001).

Specialty Adhesive Remover

Products in this subcategory utilize traditional VOC solvent ingredients such as methyl ethyl ketone, hydrocarbon solvents, xylenes, toluene, and the aerosols use hydrocarbon propellants (ARB, 2001).

Gasket or Thread Locking Adhesive Remover

Products in this subcategory use dimethyl ether or hydrocarbon propellant systems. Non-propellant ingredients for this subcategory include: n-Methyl-2-pyrrolidone, xylenes, methylene chloride, hydrocarbon solvents, methanol, monoethanolamine, water, and alcohol (ARB, 2001).

Proposed VOC Limit and Compliance:

The proposed VOC limits for Adhesive Removers are listed by subcategory, and are shown in Table VI-2, below, effective December 31, 2006. As shown in Table VI-2, using adjusted 2001 emissions, the proposed limit will result in a total estimated emission reduction of 1854 pounds per day or 0.0025 tons per day. As footnoted in Table VI-2, a negative VOC reduction is anticipated as "Gasket or Thread Locking Adhesive Removers" reformulate without the use of chlorinated solvents such as methylene chloride.

Table VI-2
Adhesive Remover Proposal*

Product Subcategory	Proposed VOC Limit (wt. %)	Complying Products/ Product Groups	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Floor or Wall Covering Adhesive Remover	5	9	42	1150
General Purpose Adhesive Remover	20	4	11	472
Specialty Adhesive Remover	70	3	6	252
Gasket or Thread Locking Adhesive Remover	50	0[1]	0[1]	(-)20[1]
Total				**1854**

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for adhesive remover products was 15%; staff believes the 2001 Survey covered 85% of the market.

1 There will be a slight VOC emissions increase due to the proposed prohibition of methylene chloride use in this category.

Reformulation Options

The proposed VOC limits for "Adhesive Removers" were established to protect public health by further reducing VOC emissions and by prohibiting the use of chlorinated Toxic Air Contaminants (TACs), such as methylene chloride. We expect that VOC limits established for this category can be met without the use of chlorinated solvents. Please see Chapter IX, Environmental Impacts for our analysis supporting the prohibition.

Reformulation options and pathways presented for this category are examples of technologies that could be used as a starting point. Staff fully expect that manufacturers and formulators will reformulate to the proposed VOC limits by making additional modifications and improvements tailored to enhance product performance and efficacy.

Based on adhesive removal claims and applications, manufacturers and formulators will be required to determine which subcategory the product belongs. Staff acknowledges that labels and adhesive removal claims for some "multi-use" adhesive removers may require appropriate modification. Staff also is aware that reformulation of products may mean that some adhesive resins or polymers may require removal using a different product. For instance, products previously formulated with methylene chloride for the purpose of general adhesive removal will likely no longer effectively remove the entire range of adhesives as before reformulation. However, consumer

needs will still be met by products formulated and marketed for the removal of specific adhesives.

To meet the proposed VOC limits, manufacturers will likely increase the use of LVP-VOC solvents. Aside from petroleum distillation, LVP-VOCs can be produced through the esterification of certain acids such adipic, or glutaric to make dibasic esters (DuPont), or oils such as soybean oil to make soy methyl esters (Vertec). Proposed VOC limits for adhesive removers will promote the use of LVP-VOCs and water emulsion formulations. Products already exist in the market that suggest the proposed VOC limits will continue to allow for the formulation of adhesive remover products to meet consumer needs. With the exception of the "Gasket or Thread Locking Adhesive Remover" category, one or more products exist that suggest the proposed VOC limits are feasible. However, industry representatives have indicated they can reformulate to meet the proposed limit.

LVP-VOCs can be used for a variety of applications. They are miscible with many organic solvents and have good solvency for a wide range of resins (USB). A concern of manufacturers is that LVP-VOCs have a dry time that is too slow, therefore leaving a slight oily residue. However, there are products on the market that meet the proposed VOC limits using LVP-VOC solvents. We also believe that the residue issue is not insurmountable. Blending solvents or the addition of surfactants greatly enhances rinseability and accelerates evaporation of LVP-VOCs; thereby lessening the residue potential. Any film or residue is easily wiped clean with a damp cloth (Soy Solv).

Biobased solvents like ethyl lactate and soy methyl esters are increasingly becoming viable alternatives to petroleum solvents, both in cost and utility (IP&P). Ethyl lactate is well suited for a variety of solvent replacement applications, including methylene chloride. It dissolves a wide range of polyurethane resins and epoxies (Paint). Soy methyl esters also show great promise for adhesive removal applications. They have high solvency power for resins and polymers, and offer great penetration characteristics (Vertec). Blending soy methyl esters with ethyl lactate increases the water rinseability of soy methyl esters and a 50/50 blend is said to equal the characteristics of methylene chloride (Industrial Paint and Powder Magazine). Bio solvents such as these are increasingly becoming competitive in the market. Supply of solvents such as these, grown from renewable resources, is more than adequate to meet increased industry use (Soy Solv), and we anticipate that as their use increases, the price of bio-solvents will likely decline.

Ethyl lactate and soy methyl esters are compatible with dimethyl ether, carbon dioxide, and traditional hydrocarbon propellants. They can often be used as a drop in replacement for many traditional solvents (Soy Solv).

Another option is to use acetone, a VOC exempt solvent. Manufacturers have reported that they do not like to use acetone in some cases because of its flammability, potential damage to plastics and painted surfaces, strong odor, and fast evaporation. However, there are currently adhesive removers that contain acetone and are used on

sensitive, painted substrates. We believe that acetone is a viable solvent for many types of adhesive remover products, especially those that remove polyester, epoxy, or cyanoacrylate adhesives, as well as some contact cements.

In products that use methylene chloride, manufacturers may use a combination of ethyl lactate, methyl esters, and LVP-VOC hydrocarbon solvents to meet the proposed limits. Product performance can be enhanced with the addition of inorganic ingredients like potassium hydroxide or formic acid (Dishart and McKim, 2003).

Products that do not contain methylene chloride may use any combination of previously discussed reformulation options, as well as increasing the use of water emulsions, surfactants, etc.

Subcategory Reformulation Options

Floor or Wall Covering Adhesive Remover

We expect products in this category to reformulate using water emulsions, as well as a variety of LVP-VOC solvents in combination with exempt or inorganic ingredients. We anticipate many products in this category will increase the water or acetone content in their formulations because this approach is relatively inexpensive. Other options include substituting an LVP-VOC hydrocarbon solvent such as Isopar M, or and LVP-VOC glycol ether for much of the VOC content. Other LVP-VOC reformulation options include using soy methyl esters and dibasic esters. These two solvents show great promise in adhesive removal applications. They tend to be more expensive than other solvents, but have a price lower than d'limonene, which is a common ingredient in these products. For the VOC content in these products, we expect formulators to use solvents like d'limonene; 2-butoxyethanol; glycol ethers; or possibly an aromatic hydrocarbon solvent. The addition of inorganic ingredients like wax; formic acid; or potassium hydroxide may be needed to aid in product penetration or lifting of the adhesive. Aerosol products may reformulate using carbon dioxide.

General Purpose Adhesive Remover

Products in this category are expected to formulate up to 20 percent of their product using VOC hydrocarbon solvents, glycol ethers, 2-butoxyethanol, or the slightly more expensive bio-solvents such as d'limonene or ethyl lactate. Blending LVP-VOCs such as dibasic esters; soy methyl esters; LVP-glycol ethers; LVP-hydrocarbon solvents such as Isopar M, or water emulsions may be used to complete the balance of the product. As with many adhesive remover reformulations, inorganic ingredients or surfactants may be required to enhance product performance. In products using aerosol delivery systems, carbon dioxide or hydrocarbon propellants may be used.

Special Purpose Adhesive Remover

Reformulation of products in this category may present the greatest challenge to manufacturers due to continually evolving adhesive technology and hybridization of disparate resin and polymer systems. A primary concern of some formulators is to completely remove difficult adhesives without damaging painted surfaces of vehicles. Commonly used ingredients to lower VOC content in products have been said to damage vehicle surfaces. However, dibasic esters (ARB, 1997), LVP-VOC solvents, acetone (ARB, 2001) and small concentrations of inorganics can be used on painted surfaces without causing damage.

As with many of the reformulation options previously discussed, VOC ingredients like ethyl lactate; xylenes; toluene; d'limonene; glycol ethers; and hydrocarbon solvents will likely continue to comprise most of the product formulation. However, we believe there are opportunities to blend many of these products with LVP-VOCs, or exempt ingredients. Many ingredients proposed as reformulation pathways blend well with traditional solvents, and are increasingly being marketed as pathways toward VOC reduction.

Acetone works well at removing many epoxy and poylester resin adhesives. Ingredients such as soy methyl esters; dibasic esters; and Isopar M are becoming recognized as reformulation options. In light of the proposed prohibition on the use of chlorinated solvents like methylene chloride, blending ethyl lactate and soy methyl esters is becoming a viable and likely pathway toward reformulation.

We do not foresee greater use of water in many product reformulations because adhesives, such as urethanes and some silicones, cure when exposed to water. However, water may be a viable option for some formulators.

Gasket or Thread Locking Adhesive Remover

Due to the proposed prohibition of chlorinated solvents, we expect many formulators to use xylenes, or similar aromatics, as well as using the slightly more expensive blends of ethyl lactate and soy methyl esters because of the similarity to methylene chloride. Aerosol products may choose to use carbon dioxide or dimethyl ether as a propellant, however, we believe they will likely continue to use a hydrocarbon propellant system as a means of product delivery. Hydrocarbon propellants are favorable because of the range of pressures to which they can be formulated. Products in this category partly rely on the force of the aerosol delivery to aid in product penetration into the adhesive.

Other ingredients likely to be chosen for use in this category include dibasic esters, LVP-VOC hydrocarbon solvents such as Isopar M, acetone, along with exempt ingredients such as wax, formic acid, and potassium hydroxide or similar surfactant.

Prohibition of use of Perchloroethylene, Methylene Chloride, and Trichloroethylene

Staff is proposing to prohibit the use of the chlorinated Toxic Air Contaminant solvents perchloroethylene, methylene chloride, and trichloroethylene in all categories of Adhesives Removers. As documented in Chapter IX, Environmental Impacts, staff has determined that use of these solvents constitutes an unnecessary health hazard. In each subcategory, except Gasket or Thread Locking Adhesive Remover, numerous alternatives products exist that perform the same function. However, data as well as consultation with industry, suggest that the proposed limit for "Gasket or Thread Locking Adhesive Remover" is feasible without the use of these TAC solvents. While only methylene chloride is presently used in Adhesive Removers, to prevent the use of perchloroethylene and trichloroethylene, staff is also proposing to prohibit their use as well.

Additional Labeling

Increasingly ambiguous product labels for multi-function products warrants the need for proposing additional labeling requirements for adhesive remover products. Therefore, staff is proposing to require the manufacturer and responsible party for each adhesive remover product to clearly display the adhesive remover subcategory name and applicable VOC limit to which the product belongs, as defined in section 94512(d) of the Consumer Products Regulation. These requirements are already in place for aerosol adhesives and are intended to clarify to ARB staff and the consumer, how the product is categorized and which VOC limit applies.

Issues:

The following summarizes the primary issues raised during the development of the proposed adhesive remover limits and presents staff's response.

1. **Issue:** The proposed VOC limit for Adhesive Removers may encourage manufacturers to reformulate their products using perchloroethylene or methylene chloride.

Response: The VOC limits are designed to allow for the reformulation of products without the use of chlorinated compounds. Nevertheless, to ensure that reformulation with chlorinated ingredients does not take place, the ARB is proposing to prohibit the use chlorinated solvents in this category.

2. **Issue:** ARB staff should propose Maximum Incremental Reactivity (MIR) standards for these categories because the VOC limits proposed are not technologically feasible.

Response: ARB staff believes that the propose mass limits for these categories are technologically and commercially feasible. Staff evaluated proposing MIR limits and found that to achieve the same air quality benefit as the proposed mass limits would

require MIR limits that were not commercially and technologically feasible (i.e. low product-weighted reactivity limits).

3. **Issue:** ARB staff should subcategorize products that remover "Stickers and Labels" from the "General Purpose Adhesive Remover" subcategory, and regulate them using a reactivity limit instead of a VOC limit.

Response: Although the proposed VOC limit for these products will be challenging, there are low VOC adhesive remover products as well as products from other consumer product categories on the market that claim to remove stickers and labels. In addition, several industry associations whose membership produce products that would be subject to this limit expressed to ARB staff that the proposed limit is technologically and commercially feasible, and have endorsed the proposal. Based on this support, analysis of survey data, and reformulation options, ARB staff concluded that the proposed VOC limit is both technologically and commercially feasible.

4. **Issue:** ARB staff should exempt products designed to remove adhesive from automotive surfaces due to the sensitivity of automotive paint substrates.

Response: ARB staff acknowledges concerns over the sensitivity of automotive substrates; however, staff believes the VOC limit for these adhesive removers is technologically and commercially feasible. We are aware of automotive products that are able to use exempt solvents to lower their VOC content.

5. **Issue:** There are not currently products that meet the proposed 50 percent VOC limit for Gasket or Thread Locking Adhesive Removers without the use of chlorinated ingredients.

Response: Lab demonstrations sponsored by industry associations demonstrated that this limit is technologically feasible.

REFERENCES

Air Resources Board. Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation. June 6, 1997. (ARB, 1997)

Air Resources Board. 2001 Consumer and Commercial Products Survey. September 24, 2002. (ARB, 2001)

Dishart, Kenneth T. and McKim, Artie (2003) Dimethylsulfoxide Solvent Formulations For Exterior Aircraft Coatings Removal. Aerospace Coatings Removal and Coatings Conference, 2003. (Dishart and McKim, 2003)

DuPont. Product Literature. "DuPont Dibasic Esters." (DuPont).

Global Spec, Industrial Adhesives.
http://industrial-adhesives.globalspec.com/LearnMore/MaterialsChemicals/Adhesives (Global)

Glue Store, Adhesives 101 – Types and Uses.
http://www.glue.store.com/adhesives101.html (Glue)

Industrial Paint and Powder, The Solvency of Soy. September 2001.
http://www.ippmagazine.com/articles/2001/sept/0901fl.htm (IP&P)

Paint & Coatings Industry, Green Solvents: Agrochemicals in Place of Petrochemicals.
http://www.pcimag.com/CDA/ArticleInformation/features/BNPFeaturesItem/0,1846,79941,00.html (Paint)

SoySolv. Telephone conversation with Steve Smith. November 5, 2003. (SoySolv)

United Soy Board Methyl Ester Sheet. Product Literature. Soy Methyl Ester Solvents Technical Background. (USB)

VertecBio. Product Literature. The Green Formulary Guide. (Vertec)

VertecBio. Agrochemical Based Biodegradable Solvent Performance Ethyl Lactate & Soy Methyl Ester
http://www.vertecbiosolvents.com/html/articles_9.html. (Vertec)

B. Anti-Static Product

Product Category Description:

Anti-Static Products are designed and labeled to eliminate, prevent, or inhibit the accumulation of static electricity that can occur on hard surfaces, such as floors and countertops, and fabrics. These products are commonly used to release static cling from clothing and are also used in commercial and institutional settings to dissipate static charge from floors and/or fabric. Many products also leave a protective film or coating on the surface to suppress static accumulation. (Alberto, 2004)

Anti-Static products do not include electronic cleaners or electrical cleaners, which are proposed for regulation as separate categories, or floor polish or wax, which is already regulated. Anti-Static products also do not include floor coatings, or any coatings subject to the aerosol or architectural coatings regulations. Anti-Static products do not include dusting aids or General Purpose Cleaners that may impart some anti-static properties.

Table VI-3 below summarizes the sales and emissions from anti-static products based on the results of the ARB's 2001 Consumer and Commercial Products Survey

(ARB, 2001). As shown in Table VI-3, Anti-Static Products are sold in both aerosol and non-aerosol forms, with the aerosol form dominating the market. VOC emissions from this category are approximately 0.278 tons per day (556 pounds per day) in California with almost 99 percent of the emissions coming from the aerosol form.

Table VI-3
Anti-Static Product*

Product Form	Number of Products/ Product Groups	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Aerosol	8	562	550
Non-aerosol	13	184	6
Total	**21**	**746**	**556**

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for anti-static products was 15%; staff believes the 2001 Survey covered 85% of the market.

The survey data also show that the aerosol and non-aerosol products are formulated very differently and have different uses. The aerosol products in this category had a sales-weighted average VOC (SWA-VOC) content of 97.7 percent, by weight, with a SWA-MIR (Maximum Incremental Reactivity) value of 1.55 tons ozone per ton product. The Ozone Forming Potential (OFP) of these aerosols was 159.4 tons ozone per year. On the other hand, the non-aerosol anti-static products had an SWA-VOC of 3.72 percent, an SWA-MIR of 0.12 tons ozone per ton product, and an OFP of 3.97 tons ozone per year.

Product Use and Marketing:

Anti-Static products are used by household, industrial, and institutional customers. Aerosol products are designed, and labeled, for usage on a variety of surfaces including machinery, draperies, floors, and clothing. By far, the household products represent the majority of the emissions in this category. The majority of the non-aerosol products are for use on hard floors in sensitive equipment work areas, but some products are also designed for use on carpeting and other fabric as well. However, all products are to be used on clean surfaces. (Hanson-Loran Co., 2003)

Aerosol anti-static products must eliminate static electricity from a wide variety of surfaces, must dry quickly, and must not be susceptible to static ignition. (Alberto, 2004) These products are generally designed for household use. Aerosols can be sprayed on clothing or other fabrics, like drapes, to relieve static cling. These products are also designed for usage on carpeting around the computer, or other form of home electronic equipment, as well as on upholstery. (Penn Champ, 2003) Most products also can be sprayed directly onto a hard surface or onto a piece of cloth and wiped on a hard

surface such as a computer monitor or other form of electronic equipment, leaving a protective coating as the solvent evaporates.

Non-aerosol anti-static products are designed mainly for industrial and institutional use. The majority of these products are used on floors to provide a protective coating from triboelectric charge, which is a charge that is generated by rubbing or friction. Non-aerosol anti-static products are applied only on clean, dry floors. However, there are a few products that are designed specifically for use on carpeting and other fabrics. (Hillyard, 2003) Some products may be buffed after use to restore the original luster and can be diluted for use in a spray and buff application. Some of these products are similar to floor polish/waxes because they provide a protective coating to flooring. Although the function of the anti-static product is to provide triboelectric protection, the most restrictive limit provision may be applicable.

Non-aerosol anti-static products are sold primarily in janitorial supply stores, however, aerosols are mainly found in supermarkets, office supply or electronics stores, and convenience stores.

Product Formulation:

Anti-Static product formulations vary by product form. Aerosol products are typically formulated with a higher VOC content than non-aerosol products. These aerosols consist mainly of alcohol to promote fast evaporation, a propellant, and a VOC exempt, or an inorganic compound, as an active ingredient. The non-aerosol products are normally water-based formulations containing no or small amounts of VOC. (ARB, 2001)

In the aerosol formulations, dry time is an issue. These products need to dry fast enough to prevent staining and mildew. For this reason, hydrocarbon gas combined with an alcohol, usually ethanol, are used in the majority of these formulations. The active ingredient in these formulations is usually a quaternary ammonium compound such as Dimethyl Ditallow Ammonium Chloride. (Alberto, 2004) The primary function of this compound is static electricity conduction and dissipation. An important side benefit is the lubricity it confers to the fabric, reducing triboelectric buildup. (MadSci Network)

Non-aerosol anti-static products are normally used as a protective finish after the floor has been cleaned and is dry. These products are composed of primarily water with either a VOC exempt compound or an inorganic compound as the active ingredient.

Proposed VOC Limit and Compliance:

The proposed VOC limits for Anti-Static Product, are 80 percent by weight for aerosol, effective December 31, 2008, and 11 percent by weight for non-aerosol, effective December 31, 2006. As shown in Table VI-4, using adjusted 2001 emissions,

the proposed limits will result in an estimated emission reduction of 102 pounds per day or 0.051 tons per day. (SOUTH COAST)

Table VI-4 also shows that there are 3 current products complying with the proposed 80 percent VOC limit (aerosol). All non-aerosol products are complying with the proposed limit of 11 percent by weight.

Table VI-4
Anti-Static Product Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products/ Product Groups	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Aerosol	80	3	2	102
Non-aerosol	11	13	100	0
Total				**102**

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for anti-static products was 15%; staff believes the 2001 Survey covered 85% of the market.

The proposed 11 percent VOC limit is designed to cap the non-aerosol form of this category since there is little opportunity for emission reductions. Therefore, no reformulation is necessary. Non-aerosol formulations are able to use such low VOC formulations because they are typically not used on clothing, which not only needs a fast dry time but needs to be non-staining to be effective.

Reformulation strategies that could be used by manufacturers to meet the proposed 80 percent, by weight, VOC limit for aerosols includes using more water as well as an alternative non-VOC propellant. While an 80 percent limit may not appear to be technologically challenging, balancing the numerous issues, including dry time, non-staining, and static charge prevention, presents a challenge. The addition of water to these products could affect the drying time of the products, the amount and types of surfaces the products can be used on, the effectiveness of the product, as well as the shelf-life of the product. (Penn Champ, 2004) However, the use of a higher pressure propellant blend and/or the use of HFC-152a blended with their current propellant could offset many of these issues. The use of corrosion inhibitors may also be instituted. The use of VOC exempts, such as acetone, is limited because of possible damage to fabrics as well as other surfaces and LVP-VOC substitution may also be difficult because of slow dry times, odor, and possible residue issues. (Exxon, 2004)

These issues will make reformulating to 80 percent a challenge; therefore, staff is proposing that aerosol products in this category be given until December 31, 2008 to comply.

Issues:

1. **Issue:** Industry has indicated that some products may be strictly consumer, or household use, vs. other products that are strictly for industrial, or commercial use, and has asked for different VOC limits to represent this difference. (CSPA)

Response: Staff disagrees with a need for further sub-categorization of this category into consumer and commercial use because upon review of the product labels and directions for use, there doesn't appear to be a difference in need, or use, that would warrant a different VOC limit.

2. **Issue:** Industry has stated that there should be no limit set for non-aerosol forms because there are no reductions to be gained. (CSPA)

Response: Staff does not believe we should drop this category from this regulatory effort. Because there are no reductions to be gained from the non-aerosol form, staff has decided to "cap" these forms of the category at a VOC limit of 11 percent by weight. This limit should not cause existing products to reformulate and will prevent products from using an unnecessary amount of VOC ingredients in the future.

3. **Issue:** According to the most restrictive limit provision, non-aerosol products that make cleaning and anti-static claims will be forced to reformulate to the proposed 11 percent limit, which is not feasible. Reformulations should not be required in instances where no reduction is to be achieved. (Sara Lee)

Response: Staff disagrees that the proposed limit is not feasible. If the product in question were categorized as a non-aerosol anti-static product, there would still be 13 out of 14 products complying. However, according to the most restrictive limit provision, products with cleaning claims are characterized as general purpose cleaners, and not an anti-static product. Anti-static products are designed solely to provide anti-static protection to surfaces that have been cleaned, or are otherwise clean. The "General Purpose Cleaner" limit for non-aerosols will be 4 percent as of December 31, 2004. Staff does not believe the products subject to the proposed limit for non-aerosol anti-static products will require reformulation.

REFERENCES

Air Resources Board. 2001 Consumer and Commercial Products Survey. September 24, 2002. (ARB, 2001)

Alberto Culver USA, Inc. Alberto Culver VOC Fact Sheet. March 24, 2004 (Alberto, 2004)

Alberto Culver USA, Inc. Fax from Gus Fiebig. April 9, 2004 (Alberto, 2004)

Alberto Culver USA, Inc. Product Label. March 24, 2004 (Alberto, 2004)

Alberto Culver USA, Inc. Telephone conversation between Gus Fiebig and ARB staff. April 5, 2004. (Alberto, 2004)

China Resources (Boxing) Oleochemicals Co., Ltd. Dialkyl Quaternary Ammonium Salts. http://www.creoleochem.com/producte/prog/prod_detail.cgi?lineno=48

Consumer Specialty Products Association (CSPA). Comments on ARB's Second Staff Proposal for Regulation Changes & Definitions. March 24, 2004 (CSPA, 2004)

Consumer Specialty Products Association – Automotive and Solvents Products Task Force. CARB Presentation. February 11, 2004 (CSPA, 2004)

ExxonMobil Chemical Company. Telephone conversation between Arlean Medeiros and ARB staff. March 2, 2004 (Exxon, 2004)

Hanson-Loran Co., Inc. Product Label. August 20, 2003 (Hanson, 2003)

Hillyard Industries, Inc. Product Label. August 20, 2003 (Hillyard, 2003)

MadSci Network. Re: How does Static Guard work? http://www.madsci.org/posts/archives/may98/892692114.Ch.r.html

Penn Champ, Inc. Product Label. August 20, 2003 (Penn Champ, 2003)

Penn Champ, Inc. Telephone Conversation with Ron Pastorelli. April 6, 2004 (Penn Champ, 2003)

Sara Lee Household & Body Care. Comments on ARB's 2004 Consumer Products Regulation Amendments – Second Staff Proposal. March 24, 2004 (Sara Lee, 2004)

C. Contact Adhesive

Product Category Description:

We are proposing to separate the existing Contact Adhesive subcategory into Contact Adhesive - General Purpose and Contact Adhesive – Special Purpose. We are proposing to define Contact Adhesive - General Purpose as a contact adhesive that is not a Contact Adhesive – Special Purpose. Therefore, if a contact adhesive were determined not to be a Contact Adhesive – Special Purpose, it would be a Contact Adhesive - General Purpose.

In the Consumer Products Regulation, a contact adhesive is defined as an adhesive that is applied to two surfaces, allowed to dry, and which provides an instant and permanent bond when proper pressure is used. Adhesive does not include units of product, less packaging, which weigh more than one pound and consist of more than 16

fluid ounces. Additionally, an exemption applies to adhesives sold containers of 1 fluid ounce or less. We are proposing to define Contact Adhesive – Special Purpose as a contact adhesive that: (A) is used to bond melamine-covered board, unprimed metal, unsupported vinyl, Teflon, ultra-high molecular weight polyethylene, rubber, high pressure laminate or wood veneer 1/16 inch or less in thickness to any porous or nonporous surface, and is sold in units of product, less packaging, that contain more than eight fluid ounces, or (B) is used in automotive applications that are (1.) automotive under-the-hood applications requiring heat, oil or gasoline resistance, or (2.) body-side molding, automotive weatherstrip or decorative trim. Therefore, a contact adhesive that is a "Contact Adhesive - General Purpose" would typically be sold in units of product, less packaging, that contain no more than eight fluid ounces and would not be a product used for automotive applications.

VOC limits and the size requirements were first introduced for consumer adhesives during the development of the "Phase II" Consumer Products Regulation. "Household Adhesives" and two subcategories, "Aerosols" and "All Others (General Purpose)," were described in the "Phase II" staff report, technical support document, and appendices (ARB, 1991a, 1991b, 1991c). Prior to the "Phase II" Board hearing on January 9, 1992, two additional adhesive subcategories, "Construction and Panel Adhesive" and "Contact Adhesive" were added to the list of "Phase II" categories for regulation. The category definition for "Household Adhesives" was modified in order to clarify the language of the regulation and more accurately define the scope of the category. Definitions were added for the terms "Contact Adhesives", and "General Purpose Adhesives." At that time, the "Contact Adhesives" subcategory was given an 80 percent VOC limit effective on January 1, 1995. (ARB, 1992; FSOR)

Contact adhesives require application to both substrate surfaces to achieve a bond, whereas general purpose adhesives only require application to one of the substrate surfaces to achieve a bond. Contact adhesives are ideal when it is awkward to clamp, or when you have large surface area. Contact adhesives are used in many applications to bond a variety of substrates. They are used extensively in the woodworking industry to bond decorative high-pressure laminates to particle board and plywood. Contact adhesives can be used for furniture; kitchen cabinets; custom display cabinets; interior and exterior panels and partitions; footwear; automotive trim; roofing membrane attachment; and a wide variety of related applications where quick, high strength permanent bonds are needed.

The local air pollution control districts in California regulate the use of the larger size contact adhesives (units of product, less packaging, which weigh more that one pound and consist of more than 16 fluid ounces) and industrial-use adhesives. There are a number of district adhesive or adhesives and sealants regulations with contact adhesive requirements. Larger districts such as the Bay Area Air Quality Management District (AQMD), the San Diego County Air Pollution Control District (APCD), and the South Coast AQMD also have requirements specific to special purpose contact

adhesives. Currently, the following districts have adhesives or adhesives and sealants regulations:

- Bay Area AQMD, Rule 8-51, Adhesives and Sealant Products;
- El Dorado County APCD, Rule 236, Adhesives;
- Placer County APCD, Rule 253, Adhesives;
- Sacramento Metropolitan AQMD, Rule 460, Adhesives and Sealants;
- San Diego County APCD, Rule 67.21, Adhesive Materials Application Operations;
- San Joaquin Valley Unified APCD, Rule 4653, Adhesives;
- Santa Barbara County APCD, Rule 353, Adhesives and Sealants;
- Shasta County APCD, Rule 3-32, Adhesives and Sealants;
- South Coast AQMD, Rule 1168, Adhesive and Sealant Applications;
- Tehama County APCD, Rule 4-40, Adhesives and Sealants;
- Yolo-Solano AQMD, Rule 2-33, Adhesive Operations; and
- Ventura County APCD, Rule 74.20, Adhesives and Sealants.

In December 1998, the ARB published the document titled "Determination of Reasonably Available Control Technology (RACT) and Best Available Retrofit Control Technology (BARCT) for Adhesives and Sealants" (RACT/BARCT) (ARB, 1998). The members of the California Air Pollution Control Officers Association's Adhesives Committee (which includes ARB staff) developed the RACT/BARCT for the purpose of meeting California Clean Air Act requirements and to provide consistency between district rules. The RACT/BARCT contains suggested VOC limits for the larger-size adhesives and sealants used in commercial and manufacturing processes that are regulated by the districts. The VOC limits in the RACT/BARCT were largely based on limits adopted in existing district adhesive and sealant rules. The district and RACT/BARCT limits were established on the basis of grams VOC per liter [g/l], less water and exempt solvents. (ARB, 1999)

In the ARB's 2001 Consumer and Commercial Products Survey, contact adhesives were reported as a single survey category. However, for this proposed regulatory action, we are proposing two separate categories: Contact Adhesive - General Purpose and Contact Adhesive – Special Purpose. We believe this is appropriate because at this time we are only proposing a new VOC limit for contact adhesives that are Contact Adhesive - General Purpose. We are proposing to retain the existing 80 percent VOC limit for contact adhesives that are Contact Adhesive – Special Purpose.

Table VI-5 below summarizes the sales and emissions from the Contact Adhesive category, based on the results of the ARB's 2001 Consumer and Commercial Products Survey (ARB,2001).

Table VI-5
Contact Adhesive*

Product Subcategory	Number of Products/ Product Groups	Category Sales (lbs/yr)	Adjusted VOC Emissions (lbs/day)**
Contact Adhesive – General Purpose	13	98,327	154
Contact Adhesive – Special Purpose	12	92,603	166
Total	**25**	**190,930**	**320**

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for contact adhesive products was 10%; staff believes the 2001 Survey covered 90% of the market.

Product Use and Marketing:

Contact adhesives that are Contact Adhesive - General Purpose are typically used by "do-it-yourself" retail customers, hobbyists, and professionals for minor repairs and small projects. These products are sold in stores that cater to both the retail and professional customers. While frequently marketed for multipurpose or general use, these products are also marketed for specific applications such as household, plumbing, and shoe repair. Contact adhesives are typically packaged in squeeze tubes, small glass bottles, or metal containers.

Products that are Contact Adhesive - General Purpose can suitable for joining a wide variety of substrates, including plastic laminates; linoleum; metal; china; wood; masonry; leather; decorative laminates; veneer; foam; cloth; paper; cork; rubber; wood particle board; plywood; and drywall. A contact adhesive is an adhesive having the property of "autohesion" which is the bonding of two adhesive surfaces to each other. In contrast, other glues primarily function by forming bonds between the adhesive surface and the substrate to be joined, which might be wood or ceramic. A contact adhesive's ability to bond strongly to itself makes it very useful for joining non-porous surfaces, such as counter tops, floor tiles, and other decorative laminates, to which as strong bond is difficult to establish. In order for autohesion to occur, the adhesive is spread evenly on both surfaces and allowed to dry before the surfaces are joined so that most of the solvent can evaporate. Then the surfaces are brought together and bonding occurs instantly without the need for sustained pressure or clamping. Consequently, contact adhesive are also effective in joining hard-to-glue surfaces and areas such as curved surfaces, where clamping is impractical and irregular surfaces.

The product labels submitted with the 2001 Survey contain instructions to use the products: 1) in well-ventilated areas; 2) start with a clean, dry surface; 3) apply a uniform coat of adhesive product to both surfaces to be bonded; and, 4) allow the adhesive to become "tacky." "Tacky" describes the initial grab or stickiness between the adhesive and the product before applying pressure. Once the adhesives become

"tacky," both surfaces are to be joined together, making sure they are aligned because once bonded the surfaces cannot be moved. Momentary pressure applied by hand or with a roller may be recommended for some applications. Some product labels also recommend roughing up the surface before use, for the best adhesion.

Product Formulation:

Contact adhesives are composed of an elastomeric polymer, which may be natural or synthetic rubber, carried in a solvent solution or in water as a latex emulsion. The earliest contact adhesives were based on isoprene, natural rubber, dissolved in solvent blends. Currently, synthetic polymers such as polychloroprene are widely used in both solvent-based and water-based contact adhesives. The typical solvent-based contact adhesive is composed of polychloroprene; t-butyl phenolic resin; magnesium oxide; zinc oxide; antioxidants; fillers; curing agents; and a mixture of solvents. Among the more common types of solvent are aliphatic hydrocarbons (hexane, heptane); ketones (acetone and methyl ethyl ketone); alcohol; and aromatics (xylene and toluene). The use of chlorinated solvents such has methylene chloride has decreased due to toxicity concerns and use prohibitions. More commonly used in industrial applications, water-based contact adhesives are typically composed of polychoroprene latex; terpene phenolic resin; zinc oxide; antioxidants; fillers; curing agents;and water.

Consumer contact adhesives are subject to the flammability requirements in the Federal Hazardous Substances Act as codified in 16 CFR Section 1302, "Ban on Extremely Flammable Contact Adhesives" (FHSA). Contact adhesives that are labeled as, marketed, and sold solely for industrial or professional use are not within the scope of this ban. Contact adhesives subject to the ban have specified product characteristics that include: 1) show a flash point at or below 20 degrees Fahrenheit; 2) are composed of a high percentage (70-90 percent by weight) of solvents and a low percent of solids (10-30 percent by weight); and 3) are packaged in containers of more than on-half (equivalent to eight fluid ounces).

Low VOC solvent based contact adhesives would typically contain more exempt solvents such as acetone or chlorinated solvents. Acetone is an exempt VOC, as a negligibly reactive VOC. However, the use of acetone can harm some substrates and can lower a product's flash point below the FHSA requirements. Because some chlorinated solvents such as methylene chloride are exempt VOCs and also has desirable solvent qualities, their use could potentially increase as products are reformulated to meet the new low VOC limits. However, use of methylene chloride in consumer products has decreased due to toxicity concerns. Methylene chloride has been identified as a Toxic Air Contaminant (TAC) by the ARB. Additionally, South Coast AQMD Rule 1168 "Adhesive and Sealant Applications" prohibits the sale for methylene chloride-based adhesives (adhesives containing one percent or more of methylene chloride) starting January 2004, with a one year sell through provision.

Because there are viable nontoxic alternatives available and complying products exist, we are proposing a TAC prohibition for contact adhesives, along with six other categories, to ensure that chlorinated solvents are not used in reformulation of products. In addition, the 2001 Survey shows that toxic compounds are used very little in adhesives anymore, and that manufacturers have formulated with safer alternative products.

Reformulation without exempt solvents is currently limited to water-based technology. Water-based contact adhesives would comply with FHSA flammability requirements. However, several manufacturers have indicated that water-based contact adhesives, while prevalent in industrial applications, do not meet the needs of typical retail customers. The manufacturers have expressed concern, and, in one case, provided supporting complaint statistics, that the typical retail user lacks the knowledge and equipment necessary to successfully apply these products with satisfactory results. Problems that could arise due to retail users lacking familiarity with the longer drying times of these products include joining the two surfaces before the "tacky" point is reached and prematurely testing the bond before full bond strength is attained. Water based contact adhesives also may not be as suitable as solvent-based products due to wetting problems and corrosion for certain substrates: 1) certain plastics, including melamine; 2) rubber; 3) flexible vinyl, and 4) possibly metals (BAAQMD 1997).

Proposed VOC Limit and Compliance:

The proposed VOC limit for Contact Adhesive - General Purpose is 55 percent by weight, effective December 31, 2006. We are not proposing a new VOC limit for Contact Adhesive – Special Purpose. The VOC limit that for Contact Adhesive – Special Purpose will remain 80 percent VOC, the current limit for contact adhesives.

As shown in Table VI-6, using adjusted 2001 emissions, the proposed limit for Contact Adhesive - General Purpose will result in an estimated emissions reduction of six pounds per day or 0.003 tons per day. Table VI-6 also shows that 80 percent of the products in the market currently comply with the proposed 55 percent VOC limit. The sales weighted average VOC content is 57.2 percent. We expect minor or no reformulation will be required for the majority of the products. The most common reformulation option that could be used by manufacturers to meet the proposed limit will be solvent substitution with an exempt solvent, such as acetone.

Table VI-6
Contact Adhesive Proposal*

Subcategory	Proposed VOC Limit (wt. %)	Complying Products/ Product Groups	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Contact Adhesive – General Purpose	55	5	80	6
Contact Adhesive – Special Purpose	80	12	100	0
Total				**6**

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for contact adhesive products was 10%; staff believes the 2001 Survey covered 90% of the market.

The 55 percent VOC limit for Contact Adhesive - General Purpose is being proposed to provide a cap on VOC content and establish a VOC limit approaching closer to the lower limits in the District rules for adhesives and sealants. Most of the large Districts currently have limits for general contact adhesives and for special substrates. Most of these Districts have a current VOC limit of 250 g/l (roughly equivalent to 30% VOC by weight) for special purpose contact adhesives. We do not believe that a 30% by weight VOC limit is feasible for the Contact Adhesive - General Purpose subcategory at this time without the use of chlorinated solvents.

Staff is proposing a 55 percent VOC limit for the general purpose subcategory. Based on information provided by manufacturers, staff believes that manufacturers need additional time to develop water-based resins suitable for household applications before the VOC limit can be lowered. Our 2001 Survey shows that products reporting a low-VOC do not recommend using the product on metal and other non-porous substrates. The only product that had a low-VOC level that recommends use on metal, had methylene chloride in its formula. With a 55 percent VOC limit, a few products may need to be reformulated, most likely with acetone, and possibly repackaged in units of eight fluid ounces or less be excluded from the federal extremely flammable ban.

We recognize that manufacturers need more time to develop new or more effective water-based resins that can be used by consumers without industrial-type application and drying equipment. Complying solvent-based industrial contact adhesives use exempt acetone solvent-based technologies but are not subject to the FHSA ban on extremely flammable contact adhesives. South Coast AQMD has also recognized the reformulation challenges for automotive contact adhesives, has extended the effective date of its limit for these products, and is currently conducting a technology review of this category (SCAQMD 2002, SCAQMD 2004). Staff has also been provided data indicating that at or below 50 percent VOC, some solvent-based technologies will be adversely effected in terms of the viscosity or "spreadability."

However, staff believes that VOC content can be capped at the proposed 55 percent VOC limit for general purpose products not subject to the FHSA ban that applies only to product packaged in units greater than one-half pint (equivalent to eight fluid ounces). However, we intend to revisit this category in subsequent rule makings to determine if there are new technologies that would enable further VOC reductions for both contact adhesive subcategories.

Prohibition of Use of Perchloroethylene, Methylene Chloride, and Trichloroethylene

Staff is proposing to prohibit the use of the chlorinated Toxic Air Contaminant solvents perchloroethylene, methylene chloride, and trichloroethylene in contact adhesives. As documented in Chapter IX, Environmental Impacts, staff has determined that use of these solvents constitutes an unnecessary health hazard. The proposed limits for contact adhesives are designed to be feasible without the use of perchloroethylene, methylene chloride, and trichloroethylene. In each subcategory, numerous alternative products exist. While methylene chloride use was reported in the 2001 Survey, staff is not aware of any methylene chloride containing products currently on the market. Although, perchloroethylene and trichloroethylene containing products were not reported in the 2001 Survey, staff is also proposing to prohibit their use as well.

Additional Labeling

Due to difficulty in distinguishing between the subcategories, we are proposing contact adhesives would be subject to additional labeling requirements as defined in Section 94512(d) of the Consumer Products Regulation. These additional requirements will ensure that all products clearly display the name of the subcategory as specified in Section 94509(a) and the applicable VOC standard of the product, in percent by weight. This information shall be displayed on the product container such that it is readily observable without removing or disassembling any portion of the product container or packaging and may be displayed on the bottom of a container as long as it is clearly legible without removing any product packaging

Issues:

1. **Issue:** Industry requests that the category be divided into three subcategories with VOC limits to take into account the unique requirements of these subcategories' applications. Industry proposes the following three subcategories and respective VOC limits: Contact Adhesive – General Purpose, 45% VOC; Contact Adhesive – Special Purpose, 80%; VOC Contact Adhesive – Special Purpose - Automotive, 70% VOC.

Response: Staff proposes that the category be divided into two categories: "Contact Adhesive - Special Purpose" (80%) and Contact Adhesive - General Purpose (55%). Many district rules have a specialty contact adhesive subcateorgy which is typically defined as a contact adhesive that is used to bond unsupported vinyl melamine covered board, metal, Teflon, ultra-high molecular weight polyethylene, rubber, or wood

veneer 1/16 inch or less in thickness to any porous or nonporous surface [South Coast AQMD (250 g/l), Ventura County (250 g/l), Sacramento Metropolitan AQMD (250 g/l), Bay Area AQMD (400 g/l), San Diego County APCD (400 g/l)]. District rules also recognize an automotive applications subcategory. Staff is proposing a single special purpose subcategory (see proposed definition) to include these products and to maintain the existing 80% VOC limit.

Most of the District rules are already in effect or will soon come into effect with new future VOC limits. However, the complying water-based industrial contact adhesives rely on specialized application and drying equipment and methods not available to household users and the acetone solvent-based products are not subject to the FHSA ban. Based on information provided by manufacturers and South Coast AQMD, staff believes that manufacturers of special purpose adhesives packed in units greater than eight fluid ounces and all unit sizes of products used in automotive applications need additional time to transfer industrial technologies or develop new water-based resins suitable for non-industrial users.

2. **Issue:** One company requested a Contact Adhesive - Automotive category. The company maintains that the adhesives used in automotive applications must bond to non-porous surfaces while maintaining adhesive performance under extremes of both hot and cold temperatures and chemical exposure such as engine oil and gasoline. The company, with products specific for automotive needs, have already reformulated to a lower VOC level depending on the specific product requirements. The company believes that since they are one of a few companies reporting contact adhesives for automotive applications, maintaining this specific use at the current VOC limit would have a negligible impact on VOC emissions.

Response: Since we are proposing that the automotive products be included in the Contact Adhesive -Special Purpose, at the current 80% VOC limit, it will not be necessary to create an additional category.

3. **Issue:** Industry requested that we add the non-porous substrate of high pressure laminate to our proposed definition for Contact Adhesive - Special Purpose.

Response: Staff has added high pressure laminate to the definition.

4. **Issue:** Two manufacturers of contact adhesives have told ARB that they are committed to continuing their research into low-VOC or water-based resins.

Response: Comment noted and appreciated.

REFERENCES

Air Resources Board. 2001 Consumer and Commercial Products Survey. September 24, 2002. (ARB, 2001)

Air Resources Board. Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation. September, 10, 1999. (ARB, 1999)

Air Resources Board. Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology for Adhesives and Sealants. December, 1998. (ARB, 1998)

Air Resources Board. Final Statement of Reasons for Rulemaking, Public Hearing to Consider the Adoption of Amendments to the Regulation for Reducing Volatile Organic Compound Emissions from Consumer Products -- Phase II. January 9, 1992. (ARB, 1992, FSOR)

Air Resources Board. Staff Report. Proposed Amendments to the Statewide Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products - Phase II. October, 1991a. (ARB, 1991a)

Air Resources Board. Technical Support Document. Proposed Amendments to the Statewide Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products - Phase II. October, 1991b. (ARB, 1991b)

Air Resources Board. Appendices. Proposed Amendments to the Statewide Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products - Phase II. October, 1991c. (ARB, 1991c)

Bay Area Air Quality Management District. Contact Adhesive Technology Review. November 1997. (BAAQMD, 1997)

South Coast Air Quality Management District. Final Staff Report Proposed Amended Rule 1168 - Adhesives and Sealants. May 2002. (SCAQMD 2002a)

South Coast Air Quality Management District. Electronic communication with William Milner, Air Quality Engineer. January 28, 2004. (SCAQMD 2004)

D. Electronic and Electrical Cleaner

Product Category Description:

Electronic and Electrical Cleaner were originally surveyed for under the category "Electronic Cleaner," which was defined as "a product designed for the removal of

contaminants such as dirt, grease, grime, moisture, dust, flux, light oil, and/or oxides from electrical components" (ARB, 2001). However, based on function and end-use variation among the products submitted in this category, as well as input from stakeholders, we are proposing to divide these products into two categories, Electronic Cleaner and Electrical Cleaner. Additionally, we are proposing that Electrical Cleaner be further subcategorized to distinguish cleaners that must be used on live (energized) equipment. Such cleaners would fall into the subcategory of "Energized Electrical Cleaner."

Electronic Cleaner

"Electronic Cleaner" products are designed to remove dirt, moisture, dust, flux, and oxides from electronic or precision equipment such as circuit boards and the internal components of radios, compact disc (CD) and/or digital video disc (DVD) players, computers, and any other sensitive, precision electronic instruments. These products are normally used in applications where the substrate is delicate, such as plastic, and can be harmed by the use of aggressive solvents or residue. Electronic Cleaner does not include products that are designed to clean casings or housings of any electronic equipment. Electronic Cleaners are not designed for use on energized equipment.

Electrical Cleaner

"Electrical Cleaner" products are designed to remove heavy soils such as grease, heavy oil or grime from electrical equipment such as electric motors, armatures, relays, electric panels, generators and/or any other electrical equipment. These products normally use aggressive solvents in order to clean heavier soils off of electrical equipment. Electrical cleaner does not include products that are designed to clean casings or housings of any electrical equipment. In electrical cleaning applications, there are situations where there is a need for non-flammable solvent. These situations occur when equipment must be cleaned while current is running through it, thus creating a spark, or flammability hazard. To address this flammability concern, and the subsequent need for special solvent in these applications, we are also proposing a category for "Energized Electrical Cleaner."

Energized Electrical Cleaner

"Energized Electrical Cleaner" products are proposed as a subcategory of Electrical Cleaner and are designed to remove heavy dirt, grease, moisture, heavy oil or grime from electrical equipment that must be cleaned while current is running through it, or when residual current exists. Typical situations, where cleaning is done while equipment is energized, would be in applications where the equipment to be cleaned is operated on alternating current (AC). An example of which is a city transformer that must remain on to provide electricity to the city. In instances where low voltage direct current (DC) is used as a power source, such as in motorized vehicles, use of an Energized Electrical Cleaner is not warranted.

Energized Electrical Cleaner products are used in applications that require nonflammable solvent and high dielectric strength. Dielectric strength is defined as the maximum voltage required to produce a dielectric breakdown through the material and is expressed as volts per unit thickness. "Breakdown is when an electrical burn-through punctures the material, or decomposition occurs. The higher the dielectric strength of a material, the better its quality as an insulator" (PTLI, 2004). "The dielectric strength cutoff for cleaners that can be used on energized equipment is generally 30 kV" (IRTA, 2003). As mentioned above, a typical application would be on AC-powered equipment that cannot be shut down before cleaning.

Electronic, Electrical, and Energized Electrical Cleaners do not include "General Purpose Cleaner," "General Purpose Degreaser," "Dusting Aid," "Engine Degreaser," "Pressurized Gas Duster," and "Anti-static product." As previously mentioned, Electronic and Electrical Cleaners do not include products designed to clean the outer casings and housings of electrical equipment.

Table VI-7 below summarizes the sales and emissions from Electronic and Electrical Cleaner, based on the results of the ARB's 2001 Consumer and Commercial Products Survey (ARB, 2001). As shown in Table VI-7, Electronic Cleaner has estimated VOC emissions of about 0.242 tons per day (484 pounds per day) in California. Electrical Cleaner has estimated VOC emissions of about 0.117 tons per day (234 pounds per day) in California. Note that in Table VI-7, Energized Electrical Cleaners were products that we believe would meet the criteria for use on energized equipment. This is because the products reported clearly indicated that they were also for use on energized equipment and would only need to relabel to meet the exemption. However, the impact of these types of cleaners on emissions is small because the predominant ingredients used are VOC-exempt compounds.

Table VI-7
Electronic and Electrical Cleaner*

Product Form	Number of Products/ Product Groups	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Electronic Cleaner	106	934	482
Electrical Cleaner	88	884	660
Energized Electrical Cleaner	14	332	82
Total	**208**	**2,150**	**1224**

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for electronic and electrical cleaner products was 10%; staff believes the 2001 Survey covered 90% of the market.

The Electronic Cleaner products had a sales-weighted average VOC (SWA-VOC) content of 52.2 percent, by weight, with a SWA-MIR (Maximum Incremental Reactivity) value of 0.71 tons ozone per ton product. The Ozone Forming Potential (OFP) of these aerosols was 119.4 tons ozone per year. The Electrical Cleaner products had a SWA-VOC of 51.2 percent, an SWA-MIR of 0.462 tons ozone per ton product, and an OFP of 108.6 tons ozone per year. The Energized Electrical Cleaner products had an SWA-VOC of 25 percent, an SWA-MIR of 0.147 tons ozone per ton product, and an OFP of 0.89 tons ozone per year. The SWA-MIRs for these categories are low due to the use of hydrochlorofluorocarbon-141b (HCFC-141b) and perchloroethylene.

Product Use and Marketing:

Electronic Cleaner

Electronic Cleaners are used by "do-it-yourself" consumers, technicians, and professional engineers in applications such as cleaning circuit boards and other internal workings of complex instruments that are easily damaged by aggressive solvents such as acetone or perchloroethylene. These types of cleaners are to be sprayed until the soil has run off the equipment, must have a rapid dry-time, and must not leave a residue. They are often marketed as light soil removing and safe on plastics.

Electrical Cleaner

Electrical Cleaners are also used by "do-it-yourself" consumers, technicians, and professional engineers, but in applications where the substrate to be cleaned tolerates aggressive solvents and the removal of heavy soils is required. These products are used on equipment such as relays, switches, and electric motors where there is a need for more aggressive solvents. They are also conductive and some product labels specify that the products have dielectric strengths ranging from 10,000 to 30,000 volts per meter. The cleaner is sprayed on the equipment and wiped off with a cloth. These products are marketed for heavier degreasing applications.

Energized Electrical Cleaner

Energized Electrical Cleaners are for use on equipment that cannot be shut off or unplugged before being cleaned or in applications that require non-flammability. An example of such an application would be a situation in which there could be residual current, even if shutdown, such as in a capacitor. These products are used exclusively in situations where the technician or engineer must clean a piece of equipment that is either active with live current or when there is a residual electrical potential. The phase-out of ozone depleting compounds such as HCFC-141b limits the availability of solvents that can be used to clean in these applications. Electronic and electrical cleaning products are sold primarily in automotive, hardware, and convenience stores.

Product Formulation:

Electronic and Electrical Cleaners are typically composed of a variety of VOC and chlorinated solvents. The most prevalent ingredient in these products is HCFC-141b (1, 1-dichloro-1-fluoroethane), which is a stratospheric ozone depleting substance. In accordance with the Montreal Protocol, HCFC-141b is being phased out. As of January 2003, HCFC-141b can no longer be produced or imported. However, electronic cleaning applications obtained an exemption from the non-essential use ban from the United States Environmental Protection Agency, such that in these applications HCFC-141b can continue to be used.

However, when existing stores are depleted, reformulated products may result in an increase in VOC emissions as well as global warming emissions, as explained in the Chapter IX, Environmental Impacts.

Electronic Cleaner

For the most part, Electronic Cleaners using VOC ingredients, contain high amounts of alkanes and/or alcohols in order to provide quick cleaning and quick drying without leaving a residue. As the survey data show, the SWA-VOC is about 25 percent by weight. However this low percentage reflects the use of HCFC-141b, which is an exempt VOC. Even though some in the industry have suggested that HCFC-141b is not safe on plastics, there are a number of aerosol and non-aerosol products using HCFC-141b. Other products are beginning to use combinations of different hydrofluorocarbons (HFC), hydrochlorofluorocarbons (HCFC), and hydrofluoroethers (HFE) in an effort to replace HCFC-141b. Each of these alternatives is available for use in both aerosol, and non-aerosol forms. These fluorinated compounds have been exempted from the United States Environmental Protection Agency's VOC definition but not from ARB's. Hence, reformulations using these compounds result in higher VOC content. A number of the aerosols in this category use carbon dioxide as their propellant in the formulations that include HCFC-141b, but the higher VOC formulas normally use a hydrocarbon propellant. It is also not uncommon to see HFC-134a used as a propellant because it is non-flammable.

Electrical Cleaner

Electrical Cleaner products are normally composed of aggressive solvents such as xylene, toluene, acetone, and 1-bromopropane. There are also products containing HCFC-141b as well as a number of products with perchloroethylene, methylene chloride, or trichloroethylene solvents. Ingredients in these products need to be able to cut grease and heavier soils in applications where the substrate to be cleaned is not easily damaged by solvent action. Aerosol electrical cleaners also tend to use carbon dioxide as the propellant, especially when chlorinated solvents are used. Most of the products in the category are aerosol.

Energized Electrical Cleaner

Electrical cleaners to be used on energized equipment, where flammability is a concern, are generally formulated with exempt chlorinated solvents, such as perchloroethylene or HCFC-141b, in aerosol and non-aerosol forms. Trichloroethylene, a VOC is also used. Carbon Dioxide is the propellant of choice because it is also non-flammable.

Proposed VOC Limit and Compliance:

The proposed VOC limit for Electronic Cleaner is 75 percent by weight, effective December 31, 2006. As shown in Table VI-8 using adjusted 2001 emissions, the proposed limit will result in an estimated emission reduction of 90 pounds per day or 0.045 tons per day. Table VI-8 also shows that 52 percent of the market currently complies with the proposed 75 percent VOC limit.

The proposed VOC limit for Electrical Cleaner is 45 percent by weight, effective December 31, 2006. As shown in Table VI-8 using adjusted 2001 emissions, the proposed limit will result in an estimated emission reduction of 128 pounds per day or 0.064 tons per day. Table VI-8 also shows that 6.5 percent of the market currently complies with the proposed 45 percent VOC limit, mostly due to the use of HCFC-141b. Products that met the limit with the use of perchloroethylene and other exempt chlorinated solvents were not included in the number of complying products or the complying market share. The "Energized Electrical Cleaner" category consists of 14 products that are likely to relabel in order to qualify for the energized exemption, all of which complying because we are not proposing a VOC limit.

Table VI-8
Electronic and Electrical Cleaner Proposal*

Product Category	Proposed VOC Limit (wt. %)	Complying Products/ Product Groups	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Electronic Cleaner	75	47	52	90
Electrical Cleaner	45	22***	6.5***	128
Energized Electrical Cleaner	n/a	14	100	n/a

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for electronic and electrical cleaner products was 10%; staff believes the 2001 Survey covered 90% of the market.

*** Does not include products that meet the limit using exempt chlorinated solvents.

Electronic Cleaner

The proposed 75 percent VOC limit for Electronic Cleaner is designed to allow for continued use of alcohol in this category. The high complying market share reflects products using exempt solvents such as HCFC-141b. Because this compound is being phased out, the proposed limit is also designed to allow for the use of other technologies as it is replaced. Besides using an alcohol, there are very few viable alternatives to VOCs that could be used to meet the requirements for this category to dry rapidly without leaving a residue or damaging the substrate to be cleaned. Even HCFC-141b is not always used because it may damage certain plastics. It is important to note that chlorinated solvents are also not used in this category, in large part, due to their propensity to damage sensitive substrates.

Electrical Cleaner

The proposed 45 percent VOC limit for Electrical Cleaners is designed to be consistent with that of "General Purpose Degreaser" (aerosol) as well as "Engine Degreaser." Because these products are used in applications that are similar, the limit reflects this. Reformulation options for Electrical Cleaner that could be used by manufacturers to meet the proposed limit include using water, acetone, other exempt VOCs, and LVP-VOCs. Alternative propellants remain an option for use as well. LVP-VOC substitution is an option for Electrical Cleaners.

The proposed limits for these categories are designed to be feasible without the use of perchloroethylene (Perc), methylene chloride (MeCl), and trichloroethylene (TCE). Under the staff's proposal, we are proposing to prohibit the use of these compounds in "Electronic Cleaner" and "Electrical Cleaner."

Energized Electrical Cleaner

Comments have been received which express concern that usage of the chlorinated solvents in Electrical Cleaners is necessary--especially in areas where cleaning is performed while the equipment is energized, or when cleaning may occur near flame, heat, or other ignition sources. Staff agrees and is proposing a separate category for "Energized Electrical Cleaner." Staff further agrees that there is a need for use of non-flammable Toxic Air Contaminant (TAC) solvents such as Perc, MeCl, and TCE, in this category, especially as the use of HCFC-141b is being phased out. Very few viable alternatives exist today.

Therefore, while we are proposing to prohibit Perc, MeCl and TCE in Electrical and Electronic Cleaners because of toxicity concerns, we are proposing that Energized Electrical Cleaners would be able to continue to contain Perc, MeCl, and TCE. Cleaning of energized equipment does pose a risk, but flammability is a lesser concern in other applications. It should also be noted that many of the existing products with a chlorinated ingredient still pose a fire hazard and have warning and cautionary

statements on the product labels indicating that the product is not to be used on energized equipment.

To account for these specialized uses, but to restrict the use of TACs to the extent feasible, we are proposing that to qualify as an "Energized Electrical Cleaner" products would need to meet very specific criteria to be able to use Perc, MeCl, and TCE. As proposed, "Energized Electrical Cleaner" products would need to meet both of the following criteria:

1) the product is labeled to clean and/or degrease electrical equipment, where cleaning and/or degreasing is accomplished when electrical current exists, or when there is a residual electrical potential from a component, such as a capacitor;

2) the product label clearly displays the statements: "Energized Equipment use only. Not to be used for motorized vehicle maintenance, or their parts."

"Energized Electrical Cleaner" products would have to clearly include a statement on the product label explaining that the product was only for use in applications where equipment is energized. The label must also clearly state that the product is not to be used for motorized vehicle maintenance, or for cleaning vehicle parts. These statements are designed to ensure that chlorinated products are only used when appropriate and prevents their use for motorized vehicle maintenance and for cleaning of motorized vehicle parts, for example, in the work performed by the approximately 35,000 Automotive Maintenance and Repair facilities in California. As always, when using these Energized Electrical Cleaner products, manufacturer specified safety precautions and good work practices should be adhered to.

Prohibiting the use of Perc, MeCl, and TCE in motorized vehicle applications would be consistent with the Airborne Toxics Control Measure for Automotive Maintenance and Repair Activities (AMR ATCM). In 2000, the ARB prohibited the use of the chlorinated solvents, Perc, MeCl, and TCE in products designed for use in AMR facilities, which included the product categories Automotive Brake Cleaner, Carburetor & Choke Cleaner, Engine Degreaser, and General Purpose Degreaser (automotive use). These products are used in similar applications as electrical cleaners that would have automotive end-uses, which includes "under-the-hood use." In adopting the AMR ATCM, the ARB determined that there was not a flammability issue with these uses because of "the use of good operating practices on the part of facility owners, mechanics, and technicians. Staff also concluded, during development of the ATCM, that the majority of aerosol products available on the market consisted of VOC-based degreasers. (ARB, 2000).

We note that when the ATCM for AMR facilities was developed, staff could find no evidence, of reports of fires, injuries, or other incidents related to the use of non-chlorinated products in AMR facilities. This conclusion was arrived at by conducting a search of statewide and national databases, as well as by making inquiries to fire departments and associations across the State. Additionally, the California State

Fire Marshal's office indicated that the combustion of gasoline, such as from a leaking fuel line, poses a significantly greater flammability concern than the use of potentially flammable aerosol products. (ARB, 2000) It is also important to note that a few facilities expressed concerns about the health and safety impacts of "poison gas" formation (referring to phosgene and other gases) when chlorinated aerosols are used near heat and flame sources (ARB, 2000).

We believe common safety precautions, as well as, good operating practices, in combination with allowing Perc, MeCl, and TCE-containing products to continue to be used to clean energized electrical equipment, addresses the issue of flammability. Moreover, the product labels submitted under the survey definition of Electronic Cleaner (which included both electrical and electronic cleaners) show that VOC-containing products had the same uses and precautions as those containing a chlorinated solvent. For these reasons, the chlorinated solvents, Perc, MeCl, and TCE would be prohibited from use in the categories "Electronic Cleaner" and "Electrical Cleaner."

We do not believe it is feasible to set a VOC limit for Energized Electrical Cleaners at this time. Solvents typically used in this type product are often VOC-exempt. The solvent of choice is HCFC-141b or another chlorinated solvent. However, use of HCFC-141b is being phased out.

Also, because of provisions already in place in the Regulation (see section 94509(e)) products not using HCFC-141b at the present time, would not be allowed to begin using it to meet a VOC limit. With the ongoing phase-out of HCFC-141b, the only solvents that seem to sufficiently fill this need are the chlorinated solvents. However, compounds that could be suitable as replacements for the chlorinated TACs and/or HCFC-141b, such as HFC-245fa and the hydrofluoroethers, are considered VOCs in California. Thus, because a low VOC limit precludes the use of alternatives to TACs, and a high VOC limit (near 100 percent) would result in no emission reductions, staff is also proposing to exclude Energized Electrical Cleaners from VOC limitations at this time.

However, progress is being made through technology and research to develop suitable non-chlorinated alternatives. We will continue to follow advances and will reevaluate this category in the future to determine if use of Perc, MeCl, and TCE is warranted.

Labeling

Due to difficulty in distinguishing between the types of products, we are proposing that each category would be subject to additional labeling requirements as defined in section 94512(d) of the Consumer Products Regulation. These labeling requirements already apply to aerosol adhesives. These proposed additional requirements will ensure that all products clearly display the name of the category as specified in section 94509(a) and the applicable VOC standard of the product, in percent by weight. This information would be required to be displayed on the product

container such that it is readily observable without removing or disassembling any portion of the product container or packaging.

Reporting Requirement

Although we are proposing to allow continued use of Perc, MeCl, and TCE in the subcategory "Energized Electronic Cleaner," we are proposing that the category would be subject to section 94513(e) of the Consumer Products Regulation. This section requires all responsible parties for consumer products that are subject to section 94509(a) and contain Perc and MeCl to report the product name, product form, the weight percent of Perc and MeCl in the product, and pounds of product sold. This annual report is to be submitted by March 1 until the year 2011. For this category, we are proposing that even though "Energized Electronic Cleaner," would not be subject to section 94509(a), in order to monitor the amount of chlorinated solvents used, reporting of usage of Perc and MeCl would be required.

Issues:

1. **Issue:** The proposed VOC limits for Electrical Cleaner and Electronic Cleaner may encourage manufacturers to reformulate their products using perchloroethylene or methylene chloride.

Response: As explained in the "Proposed VOC Limit and Compliance" section above, the category was subcategorized and the respective VOC limits are designed to allow manufacturers to reformulate their products without using perchloroethylene or methylene chloride. Different VOC limits are given because the technical feasibility of using non-chlorinated solvents is application-specific. However, "Energized Electrical Cleaner" would be allowed to use chlorinated solvent due to flammability issues that can occur during cleaning active equipment.

2. **Issue:** Electrical Cleaners should not have a restriction for usage of chlorinated solvents. Nonflammable solvents are often needed for use in Electrical Cleaner because of use on equipment with live or residual charges, and therefore need to have low conductivity and/or low flammability. These needs cannot be met by water because it is conductive and slow to evaporate. Because of the phase-out of HCFC-141b, chlorinated solvents must be allowed for use. (CSPA)

Response: Staff agrees that non-flammable solvent is needed in certain instances of electrical cleaning because of flammability issues. Since HCFC-141b is being phased out, staff has agreed to allow the use of chlorinated solvents in situations where use on live equipment cannot be avoided. The category "Energized Electrical Cleaner" has been proposed for these situations and it must be very clear on the label that products in this category are to be used exclusively in situations where the equipment cannot be shut down and/or unplugged before cleaning, or when there is a residual electrical potential from a component. However, Perc, MeCl, and TCE would be prohibited from use in "Electronic Cleaner" and "Electrical Cleaner."

3. **Issue:** ARB should develop a reactivity strategy for meeting this limit. (CSPA, Hydrosol)

Response: Staff has maintained that a mass-based VOC strategy would be the primary focus of this regulatory effort and that a reactivity strategy would only be employed if the mass-based strategies did not provide the necessary reductions. Staff evaluated a reactivity-based control strategy and found, that to achieve similar reductions as those from the proposed mass limits, would require a reactivity limit that would not be feasible. We believe the proposed mass-based limits are feasible and proposing an MIR strategy would not yield additional air quality benefits.

REFERENCES

Air Resources Board. 2001 Consumer and Commercial Products Survey. September 24, 2002. (ARB, 2001)

Air Resources Board. Final Statement of Reasons for Rulemaking: Public Hearing to consider The Airborne Toxic Control Measure for Emissions of Chlorinated Toxic Air Contaminants from Automotive Maintenance and Repair Activities. April 27, 2000. (ARB, 2000)

Air Resources Board. Staff Report: Initial Statement of Reasons for the Proposed Airborne Toxic Control Measure for Emissions of Chlorinated Toxic Air Contaminants from Automotive Maintenance and Repair Activities. March 10, 2000. (ARB, 2000)

Air Resources Board. The California Consumer Products Regulations: Title 17, California Code of Regulations, Division 3, Chapter1, Subchapter 8.5, Article 2, Consumer Products, Sections 94507-94517. September 24, 2002. (ARB, 2001)

Consumer Specialty Products Association (CSPA). Comments on ARB's Second Staff Proposal for Regulation Changes & Definitions. March 24, 2004 (CSPA, 2004)

Consumer Specialty Products Association – Automotive and Solvents Products Task Force. CARB Presentation. February 11, 2004 (CSPA, 2004)

Hydrosol, Inc. Comments to Initial Staff Proposals for VOC Standards for Changes to the Consumer Products Regulation. February 7, 2004. (Hydrosol, 2004)

Institute for Research and Technical Assistance. Assessment, Development, and Demonstration of low-VOC cleaning systems for South Coast Air Quality Management District Rule 1171. August 2003. (IRTA, 2003)

Plastics Technology Laboratories, Inc. Dielectric Strength. http://www.ptli.com/testlopedia/tests/DielStr-d149.asp (PTLI, 2004)

E. Fabric Refresher

Product Category Description:

Fabric refresher products are designed to neutralize or eliminate odor on fabric. They do not include carpet and upholstery cleaner, footwear or leather care product, spot remover, disinfectant, or products labeled for application to both fabric and human skin.

According to the results of the ARB's 2001 Consumer and Commercial Products Survey (ARB, 2001), VOC emissions from all forms of fabric refreshers are about 1.09 tons per day (2,180 pounds per day) in California. Table VI-9 below summarizes the sales and emissions from aerosol and non-aerosol fabric refreshers. Aerosol products make up 9 percent of the fabric refresher market and contribute about 39 percent of the VOC emissions from the fabric refreshers. The non-aerosol forms include pump sprays, liquids and solids. Non-aerosol products make up 91 percent of the fabric refresher market and contribute about 61 percent of the emissions from fabric refreshers.

Table VI-9
Fabric Refresher*

Product Form	Number of Products/ Product Groups	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Aerosol	16	2,982	848
Non-aerosol	61	30,670	1,332
Total	**77**	**33,652**	**2,180**

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for fabric refresher products was 30%; staff believes the 2001 Survey covered 70% of the market.

Product Use and Marketing:

Fabric Refreshers are used in households, automotive, institutional, and commercial settings to treat unpleasant odors on fabrics. This is accomplished by masking the odor with a pleasant scent or removing the odor. Household products are generally available through retailers, while the institutional and commercial products are sold via wholesalers through distribution channels or direct sales.

Household fabric refreshers are used to treat odors such as smoke, pet odors, kitchen odors, musty odors, odors caused by perspiration, germs, mold and mildew on fabric including, but not limited to, soft household surfaces, rugs, carpeting, draperies, bedding, automotive interiors, footwear, athletic equipment, clothing and/or household furniture or objects upholstered or covered with fabrics such as wool, cotton, nylon, or other synthetic fabrics.

Fabric refreshers used in institutional and commercial settings are used to control odors on fabric and/or furniture or objects upholstered or covered with fabric in sick rooms, nursing homes, hospitals, hotels, motels and restaurants.

Aerosol and pump spray fabric refresher products are usually sprayed on the fabric. The product penetrates the fabric, and the odor fades as the fabric dries. Solid fabric refresher products are typically sprinkled on the fabric surface, followed by vacuuming or sweeping.

Fabric refreshers control odors in a number of ways. Some products simply mask the bad odors with molecules that have a pleasant smell. Other products neutralize the odors by modifying the cause of the odor on the molecular level. Fabric refresher may also contain odor digesters with bacteria that create enzymes which seek and eliminate the odor's source (Abraham).

Product Formulation:

Aerosol fabric refresher products are typically either double-phase or single-phase. With single-phase aerosol products, the liquid components of the product are present in a single, homogeneous phase. These products contain a small amount of fragrance with the balance consisting of solvents and propellants. Most products contain some amount of inorganic compounds, which typically comprise less than 40 percent of the weight of the product. Metallic salt, which can be used as an odor control agent, is one of the examples of inorganic compounds that can be present in the formulation (*US Patent 6,077,318*). These aerosol products usually have a high VOC content.

Double-phase aerosols make up a greater majority of the aerosol market and usually have a lower VOC content than the single-phase aerosol products. The double-phase products contain two liquid phases and a propellant. The liquid phases consist of a larger water phase and a smaller organic phase(s), which contains a small amount of fragrance. These products must be shaken before use to mix the phases into a homogeneous emulsion. The organic phase is generally made up of liquefied hydrocarbon propellant, emulsifiers, and fragrance (ARB 1999).

The propellants used in single-phase and double-phase aerosol products are typically blends of butanes and propane, or dimethyl ether. Propellants generally constitute 15 to 90 percent of the weight of the product for single-phase aerosols, and 5 to 30 percent of the weight of the product for double-phase aerosols.

Pump spray fabric refresher products are typically composed of water, a small amount of fragrance and surfactants, and alcohol. As reported in a 2001 Survey, the amount of alcohol in the formulation varies from trace amounts to as high as 99 percent of the weight of the product. Alcohol is the main VOC found in this product form. Alcohol serves as a solvent for the fragrance compounds, stabilizing the formula. Alcohol also

controls the particle size and decreases the drying time of the fabric after product application (Procter & Gamble).

Emulsifiers are used in the product formulation to aid mixing of the fragrance compounds in the water phase by creating a homogeneous liquid that can be sprayed. Typically, the emulsifiers in the product are less than 10 percent of the weight of the product (2001 Survey).

Liquid fabric refresher products are very similar in their formulation to pump spray products, usually containing water, small amount of surfactants and slightly higher amount of fragrance on average than in pump sprays.

Solid fabric refresher products typically consist of inorganic compounds, which range from about 20 percent to about 95 percent of the weight of the product, and a small amount of fragrance. Inorganic compounds in solid fabric refreshers may serve as odor removers, moisture absorbents, desiccants and fillers (*US Patent 5,716,938; US Patent 6,703,010*).

Proposed VOC Limit and Compliance:

The proposed VOC limits for aerosol and non-aerosol fabric refresher are 15 and 6 percent VOC by weight, respectively. Staff could not propose a lower than 6 percent VOC limit for non-aerosol products due to the existing patent that Procter & Gamble holds (*US Patent 6,077,318*, Method of using a composition for reducing malodor impression, June 20, 2000). The proposed limits would be effective by December 31, 2006. As shown in Table VI-20, using adjusted 2001 emissions, proposed limits will result in an estimated emission reduction of 806 pounds per day or 0.403 tons per day.

Table VI-10 also shows that 1 percent of the aerosol market currently complies with the proposed 15 percent VOC limit, and 97 percent of the non-aerosol market complies with the proposed 6 percent VOC limit.

Table VI-10
Fabric Refresher Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products/ Product Groups	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Aerosol	15	2	1	404
Non-aerosol	6	47	97	402
Total				**806**

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for fabric refresher products was 30%; staff believes the 2001 Survey covered 70% of the market.

As described above, the main ingredients in typical aerosol fabric refreshers are water, fragrance, emulsifiers, hydrocarbon propellants and inorganic compounds. Usually the emulsifiers used are LVP-VOCs. The most likely VOC ingredient to be reduced in the formulation is the hydrocarbon propellant.

One possible method of reformulation would be to replace a portion of the hydrocarbon propellant with a non-VOC propellant such as hydrofuorocarbon-152a (HF-152a). A propellant blend of HFC-152a and hydrocarbon propellant can be used. If the product's water content must be increased, it could lead to decreased miscibility of fragrance and other organic compounds in the water phase. This effect could be mitigated by adding blends of surfactants and emulsifiers to the product. Surfactants aid in the mixing of the organic and water phases in the product to produce oil-in-water emulsions. Emulsion is necessary to allow the fragrance molecules to be discharged along with the water from the can. A manufacturer may also consider reformulating double-phase aerosol product through the use of high vapor pressure propellant and exempt VOC solvent (ARB 1999).

For non-aerosol products, we expect manufacturers of noncompliant products to formulate products similar to the compliant products, which comprise 97 percent of the market. Since alcohol is the main and often only VOC contributor in pump spray and a number of liquid fabric refreshers, it seems to be the logical target for modification in reformulations. In general, reformulation would require increasing the water content while reducing or replacing the alcohol in the products. The 6 percent VOC limit would allow an adequate level of VOC's to be present for effective solubilization of the fragrance compounds and satisfactory drying time.

REFERENCES

Abraham, Jolie. Smelling the Sweet Scent of Success. The Latest Products Tackle Odor-Control Challenges. http://www.moderncarcare.com/Articles/141deta2.htm

Air Resources Board. 2001 Consumer and Commercial Products Survey. September 24, 2002. (ARB, 2001)

Air Resources Board. Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation. September 10, 1999.

Procter & Gamble Company. Febreze Fabric Refresher Presentation. February 11, 2004.

US Patent 5,716,938. Mattress freshener & room deodorizer composition. February 10, 1998.

US Patent 6,077,318, Method of using a composition for reducing malodor impression, June 20, 2000.

US Patent 6,703,010. Spray containing amphoteric material to reduce malodors. March 9, 2004.

F. Footwear or Leather Care Product

Product Category Description:

Footwear or leather care products are applied to footwear and leather articles, to maintain, enhance, clean, protect, or modify the appearance, durability, fit, or flexibility of footwear or leather. Leather substrates include smooth leather and rough leather, such as suede, nubuck, and roughout. Footwear substrates include leather and non-leather material, such as fabric. The current proposal considers products in three sub-categories according to product form -- aerosols, solids, and "all other forms."

The footwear or leather care products category is new; the products have not been previously regulated in the Consumer Products Regulation. However, some products are closely related to products already regulated in the Consumer Products Regulation, or to products in other categories concurrently being proposed. More specifically, footwear or leather care products do not include products defined as "Fabric Protectant," "General Purpose Adhesive," "Contact Adhesive," "Rubber and Vinyl Protectant," "Fabric Refresher," or "Vinyl/Fabric/Leather/Polycarbonate Coating." This last category is currently regulated under the ARB's "Aerosol Coating Products Regulation" (ARB, 2001a), and pertains to aerosol products that apply resin or pigments to leather or fabric substrates. However, the "Vinyl/Fabric/Leather/Polycarbonate Coating" category does not include products for preserving or cleaning leather.

Table VI-11 below summarizes the sales and emissions from footwear or leather care products based on the results of the ARB's 2001 Consumer and Commercial Products Survey (ARB, 2001b). As shown in Table VI-11, footwear or leather care products contribute estimated VOC emissions of about 0.318 tons per day (637 pounds per day) in California.

Table VI-11
Footwear or Leather Care Product*

Product Form	Number of Products/ Product Groups	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Aerosol	17	310	101
Solid	25	726	348
All Other Forms	162	2,592	188
Total	**204**	**3,628**	**637**

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001b)
** Survey emissions adjusted for complete market coverage (see Chapter IV,

Emissions). The market coverage adjustment for footwear or leather care products was 10%; staff believes the 2001 Survey covered 90% of the market.

Product Use and Marketing:

The footwear or leather care products category is a group of products with a variety of functions. Examples include products to shine and protect footwear ("shoe polish"), to clean footwear and leather articles ("cleaners"), and to soften and preserve leather ("conditioners"). Examples of more specialized products include products to stretch tight-fitting footwear to loosen them for a better fit, dedicated dye products for leather and associated dye reducers used for permanent coloring, products to "dress" the edges of soles and heels of footwear, and products to remove scuff marks from footwear. As previously discussed, resin-containing aerosol products for leather substrates, such as "protectant" products that form a sometimes invisible film, and "color renew" products that replace the lost color in older leather, are considered separately as "Vinyl/Fabric/Leather/Polycarbonate Coatings," and are already regulated as "aerosol coating products."

Footwear or leather care products are used by household consumers, working professionals, outdoor enthusiasts, workers in commercial establishments, and others. Working professionals may include farmer; rancher; construction worker; security guard; law enforcement official; hospital nurse (white shoes); and military personnel ("spit shine"). Outdoor enthusiasts may include athlete; hiker; camper; hunter; equestrian rider; and leather hobbyist. These people use products for their own clothing and other leather goods. Products may also be used for commercial purposes by shoe repair shop; saddler and stable operator; automotive "detailing" shop for leather seat; leather specialty shop; and -- although less common these days -- shoe-shine-stand operator.

How products are used depend on product function and form. For example, suede and nubuck cleaners are generally aerosols to be applied to suede or nubuck footwear and to other articles with these substrates. The suede or nubuck item is then wiped clean with a dry cloth and brushed to reset the nap. Hard-paste shoe polish, a solid, is applied to footwear by brush or cloth applicator and allowed to dry to a haze. A clean cloth is then used to buff the haze to reveal a shiny wax coating. "Conditioner" products are usually liquid products applied to leather. The product is allowed to penetrate the surface to replace lost oil in the leather. For other products, use instructions may differ substantially because of the variety of products.

Footwear or leather care products may be marketed by general and specialized sales outlets. Examples include mass-market variety store; supermarket; drug store; department store; men's and women's clothing store; sporting goods store; outdoor recreation store; shoe store; shoe repair shop; uniform clothing store; saddle shop; hunting and gun shop; leather specialty shop; auto parts and supply store; and car dealership.

Product Formulation:

Footwear or leather care products include various formulas and ingredients that serve different functions or combination of functions. Active ingredients may range from hard or protective substances -- such as carnauba wax; paraffin wax; microcrystalline wax; beeswax; shellac wax; and resins (except aerosol products, since these are "aerosol coating products"), to mild substances -- such as glycerin cleaners; lanolin; and other ingredients similar to those used in lotions for human skin. Other active ingredients may include neatsfoot oil (derived from animal bones); petrolatum (petroleum jelly); mink oil; petroleum oils; solvent or pigment dyes; and organic or hydrocarbon cleaning solvents. Carriers and other ingredients may include organic and hydrocarbon solvents; water; emulsifiers; plasticizers; and propellants for aerosols.

Although generally not evident according to product labels, product use may vary greatly -- from protection of heavy-duty outdoor footwear or leather, to the other extreme -- for gentle cleaning or preservation of fine or indoor leather. For some products, there may be numerous label claims. For example, a product containing oil and wax may claim a combination of functions for "softening or conditioning;" "nurturing or moisturizing;" "dressing leather;" "preserving;" "revitalizing;" "protecting;" "shining;" "repelling dirt and stains;" or "repelling water" Some products claim to be both "cleaner and conditioner." For still other products, there may essentially be no label claim. For example, a product named "Boot Oil" and another named "Leather Lotion" may have absolutely no explanation on the labels regarding the function of the "oil" or the function of the "lotion."

The types and amounts of solvents needed to deliver the various ingredients, as well as the types and amounts of solvents used in cleaning products, vary considerably. Therefore, when products are considered as a category or by product form, VOC contents also vary considerably.

Aerosols

Aerosol products include cleaners for suede and nubuck, cleaners for athletic shoes, and miscellaneous products. As previously noted, aerosol products containing resin or pigments, such as "protectants" and "color-renew," are not in this category.

The VOC content of aerosol cleaners for suede and nubuck varies from 85 percent to 100 percent (survey data, ARB, 2001b). Current formulations contain predominantly hydrocarbon solvents, along with organic solvents, and hydrocarbon or carbon dioxide propellant. Hydrocarbon solvents include heptane (30% to over 95%), petroleum distillates such as mineral spirits or aliphatic petroleum distillates, and toluene (2 to 15%). Organic solvents include compounds such as butyl acetate, ethyl acetate, or isopropyl alcohol (2 to 10% each). The propellants include either hydrocarbons (butane-isobutane-propane blends, approximately 25%), or carbon dioxide (approximately 2%). Perchloroethylene, a chlorinated solvent cleaner, is used to a very limited extent in this category (survey data, ARB, 2001b). Since

perchloroethylene is a toxic air contaminant, it will be prohibited as an ingredient in the proposal for this category. We do not expect that this prohibition will create any technical hurdles in reformulating products to meet the proposed standard.

The VOC content of aerosol cleaners for athletic shoes varies from 10 to 20 percent (survey data, ARB, 2001b), and would generally comply with the proposed VOC standard of 75 percent by weight for aerosol products. Current formulations are water-based (75 to 90% water). The cleaning agents may be glycol ethers, alcohols, d-limonene, or a combination of these (1 to 10% each). The propellant may be hydrocarbons (butane-isobutane-propane blends) (5 to 10%).

The VOC content of other aerosol products varies from 0 to 45 percent VOC (survey data, ARB, 2001b), and would generally comply with the proposed VOC standard of 75 percent by weight for aerosol products. Example products include "shoe stretch" aerosols, and smooth-leather aerosol cleaners, polishes, and oil "conditioners" (water-based or high-content LVP-VOC).

Solids

The VOC content of traditional hard-paste shoe polish varies from 60 to 75 percent (survey data, ARB, 2001b). Essentially all of the VOC consists of the petroleum distillate solvents used, such as mineral spirits, aliphatic hydrocarbons, or stoddard solvent. These solvents enable the main ingredient waxes to be softened and formed into paste with the correct consistency, stability, and performance characteristics. The product must be readily packaged and stored in paste polish form, easily applied to shoe surfaces, sets up quickly and properly to form a dry haze, and easily buffed to a shiny wax coating. Various waxes and wax blends may be used, including hard waxes such as carnauba wax. A shoe polish product line may include many colors, with each colored-product using a different dye.

The VOC content of other solid products varies from 0 to 25 percent (survey data, ARB, 2001b), and would generally comply with the proposed VOC standard of 55 percent by weight for solid products. Example products include "conditioning" products in paste form and solid cleaners such as "saddle soap." Solid cleaners may use LVP-VOC cleaners such as glycerin. Some paste "conditioners" for applying oil or wax to heavier-duty leather may actually be "semi-solids" rather than "solids," since the 2001 survey instructions did not ask for reporting products as "semi-solids." The same situation may exist for "shoe creams," some of which may have been reported as "solid," since "semi-solid" was not a reporting option at the time of the survey. Products that are "semi-solids," including "shoe creams" that meet the definition of the form, would be in the "all other forms" subcategory. The proposed VOC standard for "all other forms" is 15 percent by weight (see next section).

All Other Forms

In terms of sales, the dominant "all other form" products are liquids which comprise 92 percent of "all other forms." Liquid products vary from 100 percent VOC ethanol-based dyes and dye reducers for coloring leather, to 0 percent VOC water-based products for cleaning or preserving fine leather, such as automotive leather. Other products include liquid "protectants" containing resin, liquid polish, "dressings," "lotions," and products to remove scuff marks from shoes. The sale of liquid cleaners and conditioners for automotive leather is substantial; however, these products are low-VOC (0 to 2% VOC), and would generally comply with the proposed VOC standard of 15 percent by weight for "all other forms." There are far fewer products in "pump spray" form. Some of these products are similar to liquids, but packaged with a pump spray.

"Semi-solids" include "shoe creams" with 10 to 30 percent VOC content, mainly due to the petroleum distillate solvents used. These products are related to the hard-paste shoe polishes (solids), except "shoe creams" are generally emulsions with 30 to 50 percent water content, making them softer and easier to apply than hard-paste polish. Other cream products may have a high content of LVP-VOCs, rather than containing water, so that VOC contents are similar to the emulsion creams.

Proposed VOC Limits and Compliance:

The proposed VOC standards for footwear or leather care products, are 75 percent by weight for "aerosol" products, 55 percent by weight for "solid" products, and 15 percent by weight for "all other forms." The proposed effective date is December 31, 2006. As shown in Table VI-12, using adjusted 2001 emissions, the proposed standards will result in an estimated emission reduction of 190 pounds per day or 0.097 tons per day in California.

Table VI-12
Footwear or Leather Care Product Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products/ Product Groups	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Aerosol	75	11	82	13.3
Solid	55	19	39	71.1
All Other Forms	15	113	87	109.5
Total				**193.9**

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001b)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for footwear or leather care products was 10%; staff believes the 2001 Survey covered 90% of the market.

Aerosols

The proposed VOC standard of 75 percent by weight for aerosol products is expected to mainly affect cleaners for suede and nubuck. Reformulation options include substitution of hydrocarbon propellants with exempt (or fractionally-exempt) propellants, such as HFC-152a or blends of HFC-152a with traditional hydrocarbon propellants (butane-isobutane-propane). Other options include substitution or partial substitution of current hydrocarbon solvents (mainly heptane and to a lesser extent various petroleum distillates) with exempt solvents. Acetone and volatile methylated siloxanes (VMS) are two exempt solvents available. Acetone is an aggressive solvent for some materials; however, acetone may be suitable for suede and nubuck since rough leather does not have a smooth surface finish to be damaged. Also, the VMS option provides an alternative and less aggressive substitute solvent, compared with acetone. Various combinations of these options are also available and provide further flexibility for reformulation.

When carbon dioxide propellant is used in a current formulation or as a substitute propellant in the future, the VOC content may still be on the order of 98 percent since the carbon dioxide content may contribute only about 2 percent of the product weight. Therefore, reformulation or further reformulation is still needed, such as with the options described above for solvent substitution, to comply with the 75 percent VOC standard for aerosol products.

As previously discussed, other aerosol products generally contain VOC below 75 percent, and would be minimally affected by the current proposal. However, these products may be reevaluated in the future, depending on the need and priorities for further emission reductions.

Solids

The proposed VOC standard of 55 percent by weight for solid products is expected to mainly affect the hard-paste shoe polishes. Reformulation options include solvent substitution of the current petroleum distillate solvents with LVP-VOC solvents, with exempt solvents such as parachlorobenzotriflouride (OXSOL 100®) or VMS solvents, or with various combinations. Reformulation would require that complying products use substitute solvents totaling approximately 5 to 20 percent by weight of the product. Since shoe polish may be marketed with a variety of colors (dyes), reformulation efforts may be considerable since each colored product may need individual reformulation (Sara Lee, 2004).

As previously discussed, other solid products generally have VOC content below 55 percent, and would be minimally affected by the current proposal. However, these products may be reevaluated in the future, depending on the need and priorities for further emission reductions. For "shoe cream" and "semi-solids," see the next section for "all other forms."

All Other Forms

For high-VOC liquid products, such as dye products, the main VOC ingredient may be alcohol, such as ethanol or isopropanol, with lesser amounts of hydrocarbon or other organic solvents. One reformulation approach is to convert to water-based or pigment dye formulations. Another approach is solvent substitution with an exempt solvent such as parachlorobenzotriflouride (OXSOL 100®).

For "shoe creams" in the form of "semi-solids," reformulation options include substitution of petroleum distillate solvents, with LVP-VOC solvents, with exempt solvents such as parachlorobenzotriflouride (OXSOL 100®) or VMS solvents, or with various combinations. Reformulation would require that complying products use substitute solvents totaling approximately 5 to 15 percent by weight of the product. Since "shoe cream" may be marketed with a variety of colors (dyes), reformulation efforts may be considerable since each colored product may need individual reformulation.

Some products in the "all other forms" subcategory already comply with the proposed VOC standard of 15 percent, and would be minimally affected by the current proposal. However, these products may be reevaluated in the future, depending on the need and priorities for further emission reductions.

Issues:

1. **Issue:** Footwear care products have changed substantially since survey year 2001 (e.g. proliferation of impregnated wipes -- that clean, protect, and shine in a single step, reducing emissions by reducing steps (reducing separate product applications)). Re-survey of products to obtain data for sales year 2003 is recommended.

Response: We have not seen information which suggests the need for a higher VOC level for products with multiple claims, such as these "combination wipe" products. As previously discussed, there are already many products with multiple label claims.

2. **Issue**: The category should be subcategorized. Product uses are evident from the product names on the labels.

Response: We disagree. Product names may not be consistent with product claims. The entire label, front and back -- needs to be reviewed. Even then, it would be extremely difficult to translate the claims to product functions and subcategories.

3. **Issue:** The reformulation task is greater than evident from the survey data, since the grouping of products decreases the apparent number of reformulations needed. For example, some products are made with a considerable number of different colors and formulations, but the products were lumped together as one group for the survey.

Response: We understand. State law requires us to consider technological and commercial feasibility and we believe that this proposal meets this requirement. As we proceed to develop future VOC standards, we will need greater efforts for smaller reductions, as finding reductions become increasingly more difficult. We may need to go beyond the approaches used in the past.

4. Issue: Footwear care products should not be combined with leather care products. Footwear care products are for different substrates, including leather and other substrates, while leather care products are not always appropriate for non-leather substrates.

Response: We disagree. Many product labels do not distinguish between footwear and leather use. Even if we separate footwear care from leather care, we will still require the most restrictive limit to apply when a product meets both definitions. The net effect would be the same as combining footwear care and leather care into one category, as we are presently proposing. The proposed VOC standards take into account both types of products.

5. Issue: Several products appear miscategorized between solid and semi-solid splits. Creation of "semi-solid" as a new product form will create uncertainty and the need to test each product in order to be classified.

Response: Since "semi-solid" was not a separate form for reporting in the survey, some products were reported as "gel" while other products were reported as "solid" or "other." We agree that certain data in the database should to be adjusted to more accurately address "semi-solid" products, and have done so. We have proposed modifications to the regulation that clarifies the definition of the "semi-solid" form.

6. Issue: Contact adhesives are excluded from the category but sealants are not. While shoe adhesive is sold as a shoe repair product, it is also used as a protective, and sometimes sacrificial coating, as well as a high endurance sealant for footwear. The proposed VOC standard should be raised to 55 percent, or the proposal should exclude sealants as well as contact adhesives.

Response: It was our intent to exclude shoe adhesive products, but did not realize such products may also be considered as sealants, which were not excluded in the original proposal. To clarify the definition, we have added wording, in accordance with the second recommendation, to also exclude "sealant products with adhesive properties used to create external protective layers greater than 2 millimeters thick."

7. Issue: ARB should exempt or provide separate VOC standards for footwear care products used by the military.

Response: Since we will have no way to quantify emissions and emission reductions relating to military use in California, we can not justify an exemption or

separate VOC standards when seeking United States Environmental Protection Agency approval of our revisions to Consumer Products Regulation.

8. **Issue:** Aerosols cover a diverse range of products, including "protectors," cleaners, waterproofers, and stretchers. Exempt VOCs and LVP-VOCs can not be substituted for traditional solvents. Acetone and methyl acetate "fog" leather and may damage leather. Non-VOC solvents and water-based products discolor leather. Dry times are too long.

Response: As previously discussed, some aerosol products containing resin, such as "protectants" and waterproofers, have been excluded from this category since the products are "aerosol coating products." We have considered the technological and commercial feasibility of various reformulation options. We have considered the feasibility of acetone, other substitute solvents, and various VOC standards for different leather substrates, different leather finishes, and different product functions.

9. **Issue:** The four "complying" aerosol products from the survey may have narrower performance characteristics.

Response: The four "complying" aerosol products include one water-based smooth leather cleaner, two oil products (with hydrocarbon propellant), and a water-based leather protectant that we have removed because it also appears to be a vinyl protectant (already regulated). It is not possible to define "narrow" or "broad" performance characteristics and make such determinations from product labels.

10. **Issue:** Aerosol products that have recently been determined to be "aerosol coating products" should be granted temporary waivers for 12 months, to allow time to implement the labeling requirements of California Code of Regulations, Title 17, section 94524(b), for these products.

Response: These aerosol coating products in this category appear to currently comply with the reactivity standard of 1.55 g O3 / g product, applicable to "Vinyl/Fabric/Leather/Polycarbonate Coatings" since January, 1, 2003. Regarding the labeling requirements, we will evaluate the need for developing an enforcement advisory which would notify affected industry and allow a timeframe for re-labeling to comply with the Aerosol Coating Products Regulation.

11. **Issue:** Products that are currently low-VOC are not expected to have higher VOC levels after a VOC standard is adopted that allows for higher levels. It is not appropriate to apply any VOC standard to "all other forms." An emission "cap" should not be proposed for "all other forms."

Response: When adopting any VOC standard, we must be aware of possible market shifts by the products. For example, if solid products need to be reformulated, changing to a semi-solid form may be a future option and a product shift in that

direction. Therefore, we need limits for various forms, such as "all other forms," to avoid possible new products that may be detrimental to air quality.

12. Issue: Some footwear care products and leather care products overlap. The two categories should be combined into a single category called "footwear or leather care products."

Response: We agree and have combined the two for the current proposal.

REFERENCES

Air Resources Board. Aerosol Coating Products. Title 17, California Code of Regulations, sections 94700-94701. (ARB, 2001a)

Air Resources Board. 2001 Consumer and Commercial Products Survey. September 24, 2002. (ARB, 2001b)

Camp, William, and Steve Hahn. Sara Lee Household and Body Care (Kiwi Brands). Communication with ARB staff. January 6, 2004. (Sara Lee, 2004)

Davidsohn, A. and Milwidsky, B.M. Polishes. C.R.C. Press: Cleveland 1968. (Davidsohn)

G. Graffiti Remover

Product Category Description:

Graffiti Remover products are designed to remove spray paint; ink; marker; crayon; lipstick; nail polish; or shoe polish from a variety of non-cloth or non-fabric substrates. This category includes products that are marketed for indoor as well as outdoor use. Products in this category work by penetrating and dissolving unwanted graffiti and/or markings, while doing little to no damage to the painted surface underneath. Graffiti Remover products do not include "Paint Remover or Stripper," "Nail Polish Remover," or "Spot Remover."

Table VI-13 below summarizes the sales and emissions from Graffiti Remover based on the results of the ARB's 2001 Consumer and Commercial Products Survey (ARB, 2001). Graffiti Removers have estimated VOC emissions of about 0.195 tons per day (390 pounds per day) in California.

Table VI-13
Graffiti Remover*

Product Form	Number of Products/ Product Groups	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Aerosol	35	300	170
Non-aerosol	30	312	220
Total	**65**	**612**	**390**

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for graffiti remover products was 15%; staff believes the 2001 Survey covered 85% of the market.

The aerosol products in this category had a sales-weighted average VOC (SWA-VOC) content of 25.7 percent, by weight, with a SWA-MIR (Maximum Incremental Reactivity) value of 0.29 tons ozone per ton product. The Ozone Forming Potential (OFP) of these aerosols was 22.3 tons ozone per year. The non-aerosols had an SWA-VOC of 9.1 percent, an SWA-MIR of 0.165 tons ozone per ton product, and an OFP of 151.4 tons ozone per year.

Product Use and Marketing:

Graffiti Remover products are used in both household and institutional settings to remove unwanted markings or to remove vandalism-related markings from a variety of surfaces. Products sold as paint strippers will remove graffiti as well. Some products are labeled as both paint removers and graffiti removers. However, Graffiti Remover products are distinguished from products in the "Paint Remover or Stripper" category, in that the underlying paint substrate is typically not damaged. They normally do not contain chlorinated solvents.

Graffiti Removers are typically sprayed on a surface and allowed to sit for a short period of time. Depending on the surface, the sprayed area is then either rubbed off with a cloth or an abrasive sponge. Some products are also to be used with a pressure wash system. The directions for use of these products depend on the type of soil to be removed and the surface it is to be removed from. Products are often marketed for use on any surface to remove any type of graffiti, ranging from lipstick, marker, and crayon to paint.

Graffiti removers are sold primarily in janitorial supply stores. Some products may also be found in paint supply stores.

Product Formulation:

Aerosol and non-aerosol Graffiti Removers are typically composed of a variety of solvents such as D-limonene, alcohol, xylene, and n-methyl-2-pyrrolidone (NMP).

However, there are a number of non-aerosol products that are water-based. Depending on the surface to be treated, these non-aerosol products can be used in a pressure wash system, which aids in the removal. Aerosol and non-aerosol graffiti removers usually contain an aromatic hydrocarbon solvent in order to adhere to the "like dissolves like" principle. There were some non-aerosol products reported in the survey that used dibasic ester mixtures as well as a few that contained glycol ethers. These compounds were normally used in water-based formulations. There were no non-aerosol products that contained a chlorinated solvent.

The aerosol products are high in VOC content because of the use of aromatic hydrocarbon solvents, hydrocarbon propellant, as well as alcohols, such as ethanol or isopropyl alcohol (Survey, 2001). The alcohols are useful in cutting, or dissolving, other markings like crayon, ink, or lipstick without damaging the underlying painted surface. Only a few aerosol products still use methylene chloride, which may not always be favorable for this category because the consumer will often want to preserve the underlying painted surface.

Proposed VOC Limit and Compliance:

The proposed VOC limits for Graffiti Remover are 50 percent by weight for aerosols and 30 percent by weight for non-aerosols, effective December 31, 2006. As shown in Table VI-14, using adjusted 2001 emissions, the proposed limits will result in an estimated emission reduction of 156 pounds per day or 0.078 tons per day.

Table VI-14 also shows that 39 percent of the market currently complies with the proposed 50 percent VOC limit for aerosols, while 11 percent of the market currently complies with the 30 percent VOC limit for non-aerosols. The aerosol products that comply do so through the use of chlorinated solvents. The complying non-aerosol products use more water as well as low-VOC alternatives, including dibasic ester mixtures. Staff is proposing that aerosols be given a higher VOC limit to allow for the use of propellant as well as the use of more solvent to make up for the inability to use ancillary equipment, i.e. a pressure washer, to aid in the cleaning.

Table VI-14
Graffiti Remover Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products/ Product Groups	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Aerosol	50	3	39	26
Liquid	30	4	11	130
Total				**156**

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for graffiti remover products was 15%; staff believes the 2001 Survey covered 85% of the market.

To comply with the proposed 50 percent VOC limit for aerosols, and 30 percent VOC limit for non-aerosols, staff believes LVP-VOC alternatives including LVP dibasic ester, LVP-VOC, glycol ether, and soy methyl esters, which are all compatible with water, to a certain degree will be used. Use of exempt VOCs such as acetone may also be viable. Each of these ingredients is effective in removing unwanted markings in an acceptable amount of time without leaving a significant residue. In the cases where there is residue, consumers are instructed, on the label, to simply rinse the surface with water.

Recent research, conducted by the City of Portland, has shown that non-toxic, VOC alternatives are as effective as commonly used VOC products in removing graffiti from a variety of surfaces, including concrete and stop signs. This study compared a wide range of graffiti removers with different ingredients ranging from dibasic ester-based products, acetone-based products, and glycol ether-based products. In reference to the use of hazardous ingredients, as opposed to non-toxic ingredients, the study, entitled "Graffiti Remover Research and Field Test Report: The Search for Safer Products," concluded that "the effectiveness of the product is not related to the inherent hazard. Many of the less hazardous graffiti removal products perform as well as, or better than, the more hazardous products." (CNAD, 2003)

As described in Chapter IX, Environmental Impacts, staff is proposing that Graffiti Remover products will not be allowed to contain chlorinated solvents. Many alternatives exist that do not use perchloroethylene, methylene chloride, or trichloroethylene. Staff is also proposing that products that are labeled to remove both paint and graffiti are Graffiti Removers.

Issues:

1. Issue: The proposed VOC limit for category name may encourage manufacturers to reformulate their products using perchloroethylene or methylene chloride.

Response: As explained in the "Proposed VOC Limit and Compliance" section above, the VOC limit is designed to allow manufacturers to reformulate their products without using perchloroethylene or methylene chloride. Manufacturers are unlikely to add chlorinated compounds to their nonchlorinated formulations because: (1) this would eliminate the benefits of a nonchlorinated product; (2) they can readily reformulate with acetone or other exempt compounds; and (3) the recognition of the potential health effects associated with perchloroethylene and methylene chloride.

2. Issue: ARB should develop an MIR strategy for meeting this limit. (CSPA, Florida Chemical Company, Hydrosol)

Response: The proposed mass-based limits are feasible and proposing an MIR strategy would not yield the maximum feasible emission reduction.

REFERENCES

Air Resources Board. 2001 Consumer and Commercial Products Survey. September 24, 2002. (ARB, 2001)

Center for a New American Dream in cooperation with the City of Portland Office of Sustainable Development. Graffiti Remover Research and Field Test Report: The Search for Safer Products. October 2003. (CNAD, 2003)

Florida Chemical Company, Inc. Comments on ARB's Proposals for VOC Standards and Regulatory Changes and Definitions. January 7, 2004. (Florida Chemical Company, 2004)

Hydrosol, Inc. Comments to Initial Staff Proposals for VOC Standards for Changes to the Consumer Products Regulation. February 7, 2004. (Hydrosol, 2004)

H. Hair Styling Product

Product Category Description:

Hair styling products are designed to be applied to wet, damp or dry hair and aid in defining, shaping, lifting, styling and/or sculpting of the hair. Hair styling is the act of manipulating the hair to modify or temporarily alter the hair's shape. A hair styling product is a product that is applied prior to and/or during the styling process to aid in achieving a hair style. A finishing product (hairspray) may then be applied after styling to lock the style in place for a period of time. The Hair Styling Product category does not include products meeting the new definition of Hairspray or Hair Mousse. However, the Hair Styling Product category may include some products such as styling sprays and spritzes that previously fell under the original definition of hairspray.

The Hair Styling Product category includes the previously regulated category of hair styling gels. Hair styling gels were regulated under "Phase I" of the consumer products regulation adopted in August 1990, and a description of these products is also included in the staff report for that item (ARB, 1990a). At that time, the Board adopted a 6 percent VOC limit for these products which was effective on January 1, 1994.

The Hair Styling Product category does not include the product form of "foam" since this would be the same as the product category of Hair Mousse in the Consumer Products Regulation. Hair mousses were regulated under "Phase I" of the consumer products regulation (ARB, 1990a). The VOC limit for hair mousses was lowered with the amendments to Consumer Products Regulation adopted in October 1999 (ARB, 1999). At that time, the Board adopted a 6 percent VOC limit for these products which was effective on December 31, 2002. In addition, the description of hair mousse in the staff report described hair mousses as foaming aerosol hair care products (ARB, 1999).

The Consumer Products Regulation will retain the current definition of Hair Mousse and Hair Mousse will be excluded from the Hair Styling Product category.

Although hair mousses are excluded from the Hair Styling Product category there are non-aerosol, pump-actuated, foaming hair styling products currently available in the market. Being non-aerosol products, they do not fit under the hair mousse definition. However, these products would meet the definition of a hair styling product, and would be subject to the proposed 6 percent hair styling product limit, specific to the pump form.

Table VI-15 below summarizes the sales and emissions from hair styling products based on the results of the ARB's 2001 Consumer and Commercial Products Survey (ARB, 2001). As shown in Table VI-15, hair styling products are sold in aerosol, liquid, pump spray, semi-solid and solid forms, with the semi-solid form dominating the market. The product form of foam is not included here since that would be covered under the current definition of hair mousse. Hair styling products have estimated VOC emissions of about 0.66 tons per day (1,316 pounds per day) in California. Care was taken to ensure that there was a clear distinction made between hair styling products and hairspray. Please see Chapter V, Page 6 for a discussion of the process staff used to analyze all hair care products.

Table VI-15
Hair Styling Product*

Product Form	Number of Products/ Product Groups	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Liquid	113	3,846	242
Pump Spray and Aerosol***	127	7,228	936
Semi-solid	390	41,024	138
Solid	67	510	2
Total	**697**	**52,608**	**1,318**

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for hair styling products was 15%; staff believes the 2001 Survey covered 85% of the market.

*** Values for Aerosol and Pump Spray are combined to protect the confidentiality of the one aerosol product reported in the 2001 Consumer and Commercial Products Survey (ARB, 2001).

Product Use and Marketing:

Hair styling products are available for personal use in the home, and are also used in commercial establishments such as hair styling salons. Hair styling products are sold in discount, department, drug, and grocery stores and are available for

purchase on the Internet. They can also be purchased in hair styling salons and beauty supply stores.

Depending on the hair styling product's form, a hair styling product is applied to the hair prior to styling or during the styling process. A hair styling product is a leave-in product applied to aid in the styling process and is not rinsed from the hair prior to styling.

Product Formulation:

Hair styling product formulations are dependant on the product form, and the type of hold and/or styling capabilities of the product. Due to the wide array of products on the market and uses for each, there is no exact and/or typical formula for the category. Hair styling products may contain a variety of fixatives and/or styling polymers (resins), to provide hold, form films, and/or condition. Besides resins, some products may contain starches, waxes and/or other types of compounds to impart hold or help retain the hairstyle. The majority of products also contain water with other possible ingredients being plasticizers, silicones, lanolin derivatives, various oils and waxes, proteins, plant and/or fruit extracts, fragrance, vitamins, preservatives, pH adjusters, neutralizers, propylene glycol, glycol ethers, and humectants. Aerosol products would also contain a propellant such as HFC-152a or a hydrocarbon propellant such as butane, dimethyl ether, isobutene, isopentane or pentane.

The predominant VOCs in hair styling products are ethanol and fragrance with most products having fragrance levels below the 2 percent exemption level, per the provision specified in the Consumer Products regulation. Ethanol is used in some hairstyling products as a solvent for a resin and/or to decrease product drying time.

The resins used in hair styling products may be either water or alcohol soluble and may be supplied to the manufacturer in either an aqueous or alcohol solution. Currently, aqueous based resins are widely used in hair styling products. Hair gels in particular employ aqueous based resins. Industry representatives state that aqueous based resins are beneficial in hair gel formulations in that they act as a thickener and can increase a product's viscosity. However, we also have been told by manufacturers that there are still products on the market that use alcohol based resins and that there is no acceptable aqueous based resin substitutes available. Industry representatives report there are still performance differences between aqueous and alcohol based resins, and that many of the "high hold" resins continue to be alcohol based. Also, different types of resins can impart a particular appearance to a product and that switching resins could affect product marketability. Another issue for some products that was raised by manufacturers was that currently, it takes more aqueous based resin than alcohol based resin in the product to provide the same degree of hold, which could cause viscosity problems in some products. For many of the products using alcohol based resins, the VOC in the product comes from the amount of alcohol needed to keep the resin in solution, or from the resin solution as it is provided from the supplier prior to

formulating the product. For these products, reducing the VOC would be difficult since an aqueous based resin must be used or the product must be discontinued.

Products that use additional alcohol other than to keep resins in solution use the alcohol for the product to dry quickly on the hair. Alcohol based styling products, like hairspray, deliver styling product to the hair as a mixture of styling product and alcohol. Alcohol based hair styling products are commonly used to finish a hairstyle because they do not rewet the hair and/or they seal off the hair from external moisture and humidity. Hair styling products that make both styling and finishing claims would be considered a hairspray and would be subject to the 55 percent VOC limit to accommodate the necessary alcohol.

Proposed VOC Limit and Compliance:

The proposed VOC limit for hair styling products is 6 percent by weight for aerosols and pump sprays and 2 percent for all other forms, effective December 31, 2006. As shown in Table VI-16, using adjusted 2001 emissions, the proposed limit will result in an estimated emission reduction of 1,032 pounds per day or 0.52 tons per day.

Table VI-16 also shows that 62 percent of the market currently complies with the pump spray proposed 6 percent VOC limit and 93 percent of the market currently complies with the 2 percent all other forms limit. Although there was only one aerosol hairstyling product without finishing claims to report in the 2001 Survey, store shelf surveys show there may be additional aerosol styling products available on the market. A 6 percent VOC limit is proposed for these products in keeping with the current 6% hair mousse limit in the regulation.

Table VI-16
Hair Styling Product Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products/ Product Groups	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Aerosol/ Pump Spray***	6	92	62	736
All Other Forms	2	490	93	296
Total				**1,032**

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for hair styling products was 15%; staff believes the 2001 Survey covered 85% of the market.

*** Values for Aerosol and Pump Spray are combined to protect the confidentiality of the one aerosol product reported in the 2001 Consumer and Commercial Products Survey (ARB, 2001).

Based on the 2001 Consumer and Commercial Products Survey. (ARB, 2001) and industry representatives, the recommended standards are feasible within the timeframe proposed in the regulation. The proposed 6 percent aerosol and pump spray and the 2 percent all other form limits should allow enough flexibility to industry to address resin solubility issues and to be able to use all resins currently on the market, including those supplied as an alcohol solution.

Industry representatives state that besides the alcohol needed to keep alcohol based resins in solution, additional alcohol for drying should not be necessary in styling products used on wet or damp hair prior to styling. Many products used on dry hair are combination styling and finishing products and would be subject to the 55 percent hairspray limit. In reviewing products that did contain higher amounts of alcohol, the directions for use and label claims were the same as for products currently on the market that comply with the proposed limits. Currently, 62 percent of the pump spray products and 93 percent of all other forms other than aerosol currently meet the proposed limits. These products contain the same marketing language, directions and claims as the products with higher VOC amounts. Although there was only one aerosol hair styling product reported in the survey, the proposed 6 percent aerosol hairstyling product limit is the same as that for aerosol hair mousses which had an effective date of December 31, 2002. Therefore, we believe this limit is feasible and that technology transferred from hair mousses is a compliance option.

Issues:

1. **Issue:** A concern exists with the change of "Gel" to "Semi-solid" – it will result in arbitrarily moving products subject to existing standards that have been adopted according to established ARB procedures under new standards without the benefit of appropriate analysis and opportunity to comment. For example, what will be the impact on "hair styling gels", a currently regulated category?

Response: To date, products currently on the market labeled as "Gel" do not fall neatly under the regulatory definition of hair gels as being "a high viscosity, often gelatinous, product". There are products currently on the market labeled as spray gels, liquid gels, gel mousse, gel pomades, etc. with various ranges in viscosity from liquids and pump sprays to semi-solid and solids or the products have creative and/or innovative names that make it more difficult to determine which category and form they may fall into. This also made the current definition of "Hair Styling Gel" difficult to enforce. To address this problem, the current hairstyling product definition was crafted to regulate products by form instead of by name. Therefore, all gels except for spray gels would be regulated as a hairstyling product – all other forms, regardless of the product's name. This is in accordance with previous ARB policies of updating regulatory definitions to reflect current market trends.

2. **Issue:** Retain the current hair gel definition that is in the existing Consumer Products rule with a new limit of 3 percent from the current VOC by weight limit of 6 percent.

Response: There are many products on the market labeled as "Gels". It is very difficult to determine if they meet the current definition requirement of "Highly Viscous". Staff has determined that a more enforceable option would be to regulate by product form instead of by name. In addition, some of the top selling hair gels currently on the market can easily comply with the proposed 2 percent VOC limit. A 2 percent limit is being proposed to allow products the option of continuing to use alcohol based resins where a substitute resin may not available.

3. **Issue:** Include a new Hair Styling Product category of Hair Volumizers with a VOC limit of 55 percent. Include hair volumizers, hair lifters and root lifters into this new category.

Response: The proposed definition is too vague, confusing and broad to be included. In searching current products in the database, there were products reported under hairspray, mousse, shampoo, conditioner, gel, serum etc. that had volumizing claims on their label or names. Many classes of products could fall under this category which were not meant to be included. In addition, there were products with formulas containing less than 2 percent VOC (after 2% fragrance exemption) that claimed to be volumizing, or to be root or hair lifters. In doing a rough analysis of the data currently in the proposed hair styling category that make volumizing, root lifting or hair lifting claims in their names, approximately 67 percent of the aerosol/pump spray products currently meet the proposed 6 percent VOC limit and 85 percent of all other form products currently meet the proposed 2 percent limit.

REFERENCES

Air Resources Board. 2001 Consumer and Commercial Products Survey. September 24, 2002. (ARB, 2001)

Air Resources Board. Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation. September 10, 1999. (ARB, 1999)

Air Resources Board. Proposed Regulation to Reduce Volatile Organic Compound Emissions From Consumer Products - Staff Report.. August 1990. (ARB, 1990a)

Air Resources Board. Proposed Regulation to Reduce Volatile Organic Compound Emissions From Consumer Products – Technical Support Document.. August 1990. (ARB, 1990b)

Information on resins:
http://www.personalcarepolymers.com/

Information on resins:
http://www.avit.com/clients/ispnew/products/hairskin/content/haircare/products/

http://www.avit.com/clients/ispnew/products/hairskin/

Info on hairstyling:

http://www.pantene.com/haircare/hair_twh_toc.htm/

http://www.freehairstyleadvice.com/content/hairproduct.html/

I. Shaving Gel

Product Category Description:

The Shaving Gel category consists of products which dispense a post-foaming semi-solid designed to be used with a blade, cartridge razor, or other shaving system in the removal of facial or other bodily hair. Shaving gels facilitate the shaving of facial and other bodily hair by providing lubricity, while also protecting and moisturizing the skin. Shaving gels are aerosol products by definition, although they differ from typical aerosol products (product and driving propellant are mixed) in that the majority of shaving gels on the market utilize barrier pack (compartmentalized) systems in which the semi-solid (gel) is separated from the driving propellant. The shaving gel category does not include shaving creams, which are currently subject to the Consumer Products Regulation. In contrast to shaving gels that dispense post-foaming semi-solids, the shaving cream concentrate is mixed with the driving propellant and thus is expelled from the container as a foam lather.

Table VI-17 below summarizes the sales and emissions from shaving gels based on the results of the ARB's 2001 Consumer and Commercial Products Survey (ARB, 2001). As indicated, 27 shaving gels were sold in California in 2001, which was by 10 companies. Please note that the actual number of products reported is greater than 27; several companies grouped products with up to 2 percent variation in VOC due to differences in fragrances used. Shaving gel VOC emissions are about 1.03 tons per day (2,060 pounds per day) in California.

Table VI-17
Shaving Gel*

Product Form	Number of Products/ Product Groups	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Aerosol	27	26,800	2,060

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for shaving gel products was 15%; staff believes the 2001 Survey covered 85% of the market.

Product Use and Marketing:

Shaving gels are used to aid in the removal of facial or other bodily hair. Typically after wetting the skin, the shaving gel is dispensed into the hand, onto the fingertips, or directly to the area to be shaved. The product is then rubbed or massaged over the skin surface. A shaving system such as a razor blade is then used to remove the hair. After hair removal, the remaining product is removed, usually by rinsing with water.

Shaving gels are sold in a variety of retail outlets including grocery stores; drug stores; beauty supply stores; discount stores; and department stores. Shaving gels are also available for purchase over the Internet. The most common shaving gel product size is 7 weight ounces, although some companies offer smaller (i.e. travel size) and larger sizes.

Product Formulation and Packaging:

The VOC content of products in this category ranges from 2.7 to 13.3 percent by weight, with a sales weighted average of 7.7 percent by weight. Shaving gels employ compartmentalized packaging systems, most commonly the bag-in-can and piston-type barrier-pack systems, in which the blowing agents (also called post-foaming agents) and driving propellants are contained in separate chambers or compartments (SanGiovanni). The VOC content of shaving gels is attributable to these two propellants.

Blowing agents are a component of the shaving gel concentrate and provide the post-foaming effect of shaving gels. Once the gel is dispensed and spread, the blowing agent changes from an initial liquid phase to a gas phase, which causes the product to foam. The gel concentrate is located either inside an inner container or bag (in the case of bag-in-can barrier pack systems), or located in the can above the piston (in the case of piston-type barrier pack systems). Shaving gel blowing agents reported for the 2001 Survey include pentane, isopentane, and isobutane, with the most common being isopentane/isobutane blends. No products were reported in the 2001 Survey that used blowing agents other than hydrocarbon VOCs.

Driving propellants are used to expel shaving gels from the container. Shaving gel driving propellants differ from standard aerosol propellants in that they are physically separated from the gel product, rather than being mixed with the product as typical aerosols. Driving propellants are contained outside of the bag in bag-in-can systems, or below the piston in piston-type barrier pack systems. Shaving gel driving propellants reported for the 2001 Survey include compressed air, butane, isobutane, and propane, with the most common being isobutane and propane/isobutane blends.

The balance of shaving gel ingredients includes emollients such as stearic and palmitic acid; surfactants such as triethanolamine and polyethylene glycols; thickeners such as cocamide DEA, hydroxyethylcellulose, and PVP (Polyvinylpyrrolidone); preservatives such as methyl and propyl paraben; moisturizers such as aloe vera gel; and neutralizers such as triethanolamine. Water is the solvent used for shaving gels. In addition, most shaving gels also contain fragrance and colorants.

As previously mentioned, shaving gels employ compartmentalized packaging technologies, in which the blowing agents and driving propellants are contained in separate chambers or compartments. The development of compartmentalized aerosol packaging technologies (barrier-pack systems) has advanced greatly since the first barrier packs were developed in the 1950s and 1960s (Johnsen, October 2001). In addition to providing a method for separating driving propellants from product concentrates, additional benefits of barrier packs include use in any orientation (many conventional aerosols lose propellant when inverted), and being quiet during use (don't produce the typical hiss associated with aerosols) (SanGiovanni). Today there are numerous material and packaging options for shaving gel manufacturers using barrier packs including various can types and sizes, bags/pouches/inner containers, piston materials, actuators/valve systems, and use with both liquefied and compressed gas/air propellants.

Concerning bag-in-can technologies specifically, there are generally two types. In the first, the bag or pouch is attached to the can at the can curl, and in the second, the bag is attached to the valve (referred to as "bag-on-valve" technology). In the first type, the product is injected into the open bag/pouch prior to valve attachment, then the bag is hermetically sealed during the crimping process. The driving propellant (typically hydrocarbon) is then injected through a hole in the bottom of the can. This type of system can be immediately identified by the presence of a bottom plug (grommet) which is used to contain the propellant (Johnsen, February 2002) (SanGiovanni). In the second type of system in which the bag is attached to the valve, an under-the-cap gasser is used to add the driving propellant (typically nitrogen or compressed air) before the crimp is made. The gel is forced into the bag, via the valve, and the exo-space gas is compressed. Bottom plugs/grommets are absent with this system (Johnsen, October 2001).

Piston-type barrier-pack systems consist of a can, open at the bottom, into which a piston is inserted. The bottom, which is perforated with a central hole, is then seamed on. Product filling takes place through the valve opening prior to insertion of the valve.

Because the can bottom has a hole, when the piston is displaced by the product upon filling, any air below the piston is expelled. After the valve is attached, the package is bottom-gassed with propellant and the bottom hole plugged with a grommet (SanGiovanni).

An additional packaging technology has been available and used for several years by various consumer products companies, including shaving gel manufacturers. The ATMOS system made by Exxel Container, Inc. utilizes a self-pressurized dispensing system, without the use of a driving propellant. The ATMOS system consists of a plastic bottle that is inserted into a rubber tube (sleeve). When the product is filled into the bottle, the rubber sleeve expands. The sleeve's natural tendency to return to original size provides the propelling power for the system. The system is available in sizes typically used for shaving gels, and in addition to being absent of a driving propellant, the ATMOS system utilizes plastic containers which are beneficial in wet-shaving environments (Exxel). Because no driving propellant is used in the ATMOS system, it is a low-VOC technology.

Proposed VOC Limit and Compliance:

As shown in Table VI-18 below, we are proposing a two-tiered VOC limit for shaving gels. The proposed Tier 1 VOC limit is 7 percent by weight, effective December 31, 2006. The proposed Tier 2 VOC limit is 4 percent by weight, effective December 31, 2009. Using adjusted 2001 emissions, the proposed limits will result in an estimated emission reduction of 226 pounds per day or 0.113 tons per day for Tier 1, and 762 pounds per day or 0.381 tons per day for Tier 2.

Table VI-18
Shaving Gel Proposal*

	Proposed VOC Limit (wt. %)	Complying Products/ Product Groups	Complying Market Share (%)	Emission Reductions (lbs/day)**
Tier I	7	15	34	226
Tier II	4	1	< 0.1	762

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for shaving gel products was 15%; staff believes the 2001 Survey covered 85% of the market.

As shown in Table VI-36, at the time of the 2001 Survey over a third of the market complied with the proposed Tier I limit of 7 percent by weight. Most of these products comply by using slightly lower amounts of hydrocarbon propellants. Also shown in the table, at the time of the 2001 Survey a very low percentage of the market complied with the proposed Tier II limit of 4 percent by weight. However, one product did comply and as described in subsequent paragraphs, we are aware of several other Tier II compliant products that have appeared on the shaving gel market since the 2001

Survey was performed. For both limits, we believe manufacturers will be able to comply by using the same ingredients and packaging technologies as are used today.

Although we believe the Tier II limit is technically feasible in the nearer term, we recognize that for some manufacturers, significant changes to the manufacturing process will be necessary. Therefore we are proposing to provide additional time to comply with the Tier II limit. In recognition of the reformulation and production challenges, staff is committing to conduct a technical review in advance of the Tier II effective date.

Compliance with the proposed limits will likely focus on reducing levels of the VOC propellants (blowing agents and driving propellants) used in shaving gels. Other options include use of compressed gas or compressed air driving propellants, use of VOC/non-VOC propellant blends, use of self-pressurized containers that eliminate the need for driving propellants, or a combination of these options.

Reduction in Hydrocarbon Driving Propellants and Blowing Agents

In the 2001 Survey, a wide range of driving propellant and blowing agent weight percentages were reported. The range for driving propellants reported was 0-10 percent by weight. The range for blowing agents reported was 2-5 percent by weight. Shaving gel patents for several companies support this blowing agent range, listing the preferred level of blowing agent in post-foaming shaving gel concentrates to be 2-5 percent (Procter & Gamble, Pfizer, S. C. Johnson, Gillette). In order to comply with the proposed standards, some manufacturers may only need to reduce the amount of driving propellant and/or blowing agent used.

Shaving gel manufacturers indicated that one reason for use of higher levels of driving propellant was to account for propellant leakage through the bottom plug/grommet. We are also aware of driving propellant bag permeation issues specific to some bag-in-can systems. In cases such as these, additional overfill of driving propellant is used to ensure there is enough propellant to empty the container. In order to comply with the proposed standard, some manufacturers may choose to reduce overfill of driving propellants through use of alternative grommet styles that minimize leakage, or even through elimination of the grommet all together by using top-filling, bag-in-can technologies.

Compressed Gas/Compressed Air Driving Propellants

According to the Survey, compressed gases, as well as hydrocarbons, are currently employed as driving propellants in shaving gel barrier-pack systems. Bag-in-can and piston-type barrier packs may be used with non-VOC driving propellants, such as compressed air or nitrogen (Johnsen, Oct 2001). Several companies (see partial list below) manufacture bag-in-can barrier pack systems which are designed for use with compressed gas and compressed air driving propellants (Spray).

Some companies that provide compressed gas and/or compressed air bag-in-can systems for shaving gels:

EP Spray System
Lindal Group
Lechner, USA Ltd.
CCL Industries, Inc.
Aerosol-Service AG (ASM)

EP Spray System has representatives in Europe, USA/Canada and Asia, and supply a bag-in-can, valve/actuator system for use with compressed air or nitrogen driving propellants (EP, internet). Lindal Group is one of the main suppliers for the Nivea compressed air shaving gel, supplying a bag-on-valve system and the shaving gel actuator to Beiersdorf AG (Lindal). Lechner, USA Ltd. developed a unique "sprayed-in" bag or pouch that works very well with compressed gases (Johnsen, January 2002). CCL Industries Inc. also produces a bag-in-can system and states that discharge rates using nitrogen propellants are satisfactory for many applications, especially high-viscosity products such as gels. In addition, CCL states that use of Nitrogen minimizes flammability and VOC concerns (CCL). Aerosol-Service AG manufacturers their own bag-on-valve system for use with compressed air, and fills products for several other companies that utilize compressed air, bag-on-valve systems (ASM). In addition, there are several European bag-in-can systems in which pressurization with either nitrogen or compressed air is preferred (Johnsen, October 2001). In general, we are also aware that the bag-on-valve system, using compressed air, is well known and accepted in Europe (ASM).

Concerning piston systems specifically, piston technologies are quite developed and there are over 30 different pistons and designs available, in at least four can diameters, using at least three plastics (Johnsen, October 2001). Taller pistons are available for taller cans where the preferred propellant is nitrogen or compressed air (Johnsen, November 2001).

Manufacturers have expressed concerns that using compressed gases as driving propellants results in a pressure drop in the barrier pack over the life of the shaving gel. However, it has been reported that the pressure drop can be minimized by using oversized valve body and stems (Johnsen, February 2002), and by using actuators to control the flow and volume of the dispensed shaving gel, which helps compensate for the pressure drop associated with the systems (EP, conversation). Also to offset the pressure drop, for piston-type systems, expanding the percentage of the can capacity consigned to the exo-space can be done by increasing piston height, or by using a smaller piston-type can. For the bag-in-can options, there may be some flexibility in bag capacities, or the can may be made longer (Johnsen, January 2002). One manufacturer indicated that even though there is a pressure difference as the compressed air shaving gels are dispensed (also occurs in hydrocarbon-driven shaving gels to a lesser extent), because the product is dispensed in such a small amount per use, they do not consider this a consumer-distinguished trait (EP, conversation).

Blends of Driving Propellants

Manufacturers may want to investigate the use of various driving propellant blends, including hydrocarbon/HFC-152a blends. The addition of the non-VOC propellant HFC-152a to the driving propellant system alone, or more likely as a blend, may provide the decrease in VOC levels necessary for compliance.

Self-pressurized Containers

Several shaving gels have been and are currently available on the market that use the self-pressurized dispensing ATMOS system from Exxel Container, Inc. No driving propellant is required to dispense the product (Exxel). Companies that choose to use the ATMOS system or other self-pressurized systems would be able to reserve the VOC in their product for the blowing agent portion of their product.

Issues:

1. **Issue:** Because driving propellants are not mixed with the gel concentrate itself, and not expelled from the can during consumer use, the VOCs attributable to driving propellants should not be included in the total VOC content of shaving gels.

Response: As clarified in ARB's Enforcement Division Advisory Number 300, for compartmentalized aerosol products like shaving gels, the total weight of VOC for a product includes the VOC contained in the driving propellant (ARB Advisory 300). For both the 1997 and 2001 ARB Consumer and Commercial Product Surveys, several companies did not at first report driving propellants due to the misconception that because driving propellants are not mixed with the gel product itself, they are, therefore, not part of the reportable formula. For both the 1997 and 2001 Surveys, the companies were asked by ARB staff to submit complete formulation data, and the survey data were updated accordingly.

2. **Issue:** There is not total evacuation with compressed air and nitrogen systems.

Response: There are bag-in-can barrier packs available today using compressed air and nitrogen that yield over 98 percent evacuation rate, which is comparable to shaving gels using hydrocarbon driving propellants (EP, conversation). With any barrier pack system, there will be residue left in the container.

3. **Issue:** Special cans will be required when non-VOC propellants are used.

Response: Staff has information that suggests this may not be true. For example the EP Spray System fits standard aerosol cans, either aluminum or tin plate, with a 1" opening. No special inner coating is required. The system can be filled with traditional aerosol filling equipment such as: Pamasol, KP-Aerofill, Terco, Coster, with only minor adaptation to the filling heads (EP, filling).

4. **Issue:** The cost will be too high to convert our piston filling lines to bag-in-can systems in order to use compressed air for a driving propellant.

Response: Staff agrees that converting from a piston system to a bag-in-can system would be costly, although information suggests that piston-systems are able to be used with compressed gases. Recognizing the challenge, however, staff is proposing to provide additional time to comply with the Tier II limit (December 31, 2009) to give manufacturers time to find the most cost effective means to comply.

5. **Issue:** The cost of the ATMOS system is too high.

Response: The Manufacturer of the ATMOS system has indicated that when purchasing in larger quantities, the cost of using ATMOS systems is comparable to standard bag-in-can systems (Exxel).

REFERENCES

Air Resources Board. 2001 Consumer and Commercial Products Survey. September 24, 2002. (ARB, 2001)

Air Resources Board Enforcement Division- Advisory 300. Calculating the VOC Content of Compartmentalized Aerosol Products. March 2002. (ARB Advisory 300)

Aerosol-Service AG. Bag-On-Valve Systems. Company Literature, April 2004. (ASM)

CCL Industries, Inc. Bag In A Can (ABS). http://www.cclind.com/container_products_abs.html. 2004. (CCL)

EP Spray System, Inc. Telephone conversation with ARB staff. February 6, 2004. (EP, conversation)

EP Spray System, Inc. Spray and Dispensing Systems With Compressed Air. http://www.epspray.com/e/presentation.htm. February 2004. (EP, internet)

EP Spray System, Inc. Filling Recommendations. Company literature, February 2004. (EP, filling)

Exxel Container. CARB Presentation. Teleconference with ARB Staff, October 16, 2003. (Exxel)

Johnsen, M.A. Compartmentalized Dispensers....a New Era for Aerosols. Spray Technology & Marketing, October 2001. (Johnsen, October 2001)

Johnsen, M.A. Compartmentalized Dispensers: Part II, The Piston Can. Spray Technology & Marketing, November 2001. (Johnsen, November 2001)

Johnsen, M.A. Compartmentalized Dispensers: Part III, The Bottom Plug. Spray Technology & Marketing, January 2002. (Johnsen, January 2002)

Johnsen, M.A. Compartmentalized Dispensers: Part IV, Bag-in-Can Modalities. Spray Technology & Marketing, February 2002. (Johnsen, February 2002)

Lindal Group. New Actuators for Nivea Shaving Gel. http://www.lindalgroup.com/en.news_arch.php. February 5, 2002 (Lindal)

SanGiovanni, M.L. Alternative Systems Push for Market Share. Spray Technology & Marketing, August 1992. (SanGiovanni)

Spray Technology & Marketing. A Look at Barrier Packs. Spray Technology & Marketing, April 1997. (Spray)

U.S. Patent 5,248,495, "Post foaming shaving gel composition", Patterson, The Procter & Gamble Company, filed April 16, 1992. (Procter & Gamble)

U.S. Patent 5,560,859, "Post foaming shaving gel composition", Hartmann, Pfizer Inc., filed June 1, 1995. (Pfizer)

U.S. Patent 5,858,343, "Post-foaming shaving gel including poly(ethylene oxide) and polyvinylpyrrolidone in a preferred range of weight ratios", Szymczak, S. C. Johnson & Son, Inc., filed January 31, 1997. (S. C. Johnson)

U.S. Patent Application 20040013633, "Shave gel composition containing polyglyceryl ester surfactant", Novikov, The Gillette Company, filed July 19, 2002. (Gillette)

J. Toilet/Urinal Care Product and Solid/Gel Room Air Freshener

This section provides information on two proposals that are related, one for the proposed category of "Toilet/Urinal Care Product," and another for revising an existing category, "Air Fresheners - Solid/Gel." This Section focuses primarily on the VOC benefits that would be realized as a result of the "Health Risk and Needs Assessment for Prohibiting the Use of Para-dichlorobenzene (PDCB) in Solid Air Fresheners and Toilet/Urinal Care Products Used in Toilet/Urinal Care Products and Solid/Gel Room Air Fresheners." For a more detailed discussion of the toxics considerations of the proposal, the reader is referred to Chapter VII, Health Risk and Needs Assessment for the Airborne Toxic Control Measure for Para-dichlorobenzene Solid Air Fresheners and Toilet/Urinal Care Products.

Background

In 1991, the ARB in their Phase I Consumer Products Regulation established a VOC limit for the solid/gel air freshener category. Toilet/urinal deodorizing products

(that are not primarily considered as cleaners) were included within the definition of "air freshener," and were required to meet the 3 percent VOC by weight limit. The exception to this is that the Regulation specifically exempted products containing at least 98 percent para-dichlorobenzene (PDCB), and products comprised entirely of fragrance. At the time staff determined that PDCB toilet blocks filled a unique niche with very few viable competing products. This exemption was granted with the intention of following the health effects evidence in the future as well as the use trends in the category and the availability of non-toxic or non-carcinogenic alternatives.

Product Category Descriptions:

Toilet/Urinal Care Products

"Toilet/Urinal Care Products," as proposed, are products designed specifically to deodorize, clean, or both deodorize and clean, toilet bowls, toilet tanks, and/or urinals. The category would also include products used for portable toilets and urinals at temporary sites, including recreational motor homes, boats, and aircraft, etc.

Cleaning products for dedicated toilet/urinal use are not currently regulated. The existing category, "Bathroom and Tile Cleaner," applies to products for cleaning tile or surfaces in bathrooms, but not to products specifically designed to clean toilet bowls, toilet tanks, or urinals. The proposed new category for "Toilet/Urinal Care Product" will include these toilet/urinal cleaning products.

Solid/Gel Room Air Fresheners

Room air fresheners are designed to mask odors, or to freshen, clean, scent, or deodorize the air in a bathroom, kitchen, or other space. Currently, solid/gel room "air fresheners" are subject to the 3 percent by weight VOC standard, except for products meeting the exemption for products containing at least 98 percent para-dichlorobenzene, and products comprised entirely of fragrance. The current proposal would eliminate the para-dichlorobenzene exemption contained in section 94510(g). Effectively, this proposal would prohibit the sale of para-dichlorobenzene room "air fresheners," because we are not aware that these products can meet the 3 percent VOC standard for solids and gels. However, to ensure that there is no unnecessary exposure to PDCB emissions, we are proposing a specific prohibition on the use of PDCB in both Air Fresheners and Toilet/Urinal Care Products to ensure that no PDCB can be used. See Chapter VII for a discussion of the ATCM.

However, since the exemption was put in place, in recognition that no alternatives existed, today we find that the market has changed substantially, and many competing products now not only deodorize but also clean. These products are popular with consumers, despite their somewhat higher average price, as discussed below regarding product use and marketing. We also note that from ARB 2001 survey data, no 100 percent fragrance air fresheners were reported for toilet or urinal use. In

addition, no 100 percent solid air fresheners were reported in the 1997 Consumer Products Survey.

Because of the variety of products available today and because of similar uses, under the staff's proposal, we would realign the solid/gel air fresheners for use in toilets and urinals, and including them in the newly proposed category of "toilet/urinal care products."

The remaining information is presented in three parts, first, data and information on Toilet/Urinal Care Products will be presented, followed by information on Solid/Gel Air Fresheners. These descriptions will be followed by a discussion of the combined emission reduction benefits from the staff's proposal.

TOILET/URINAL CARE PRODUCTS

Sales and Emissions

Table VI-19 below summarizes the sales and emissions from the category "Toilet/Urinal Care Products," based on the results of the ARB's 2001 Consumer and Commercial Products Survey (ARB, 2001b). As shown in Table VI-19, VOC emissions from "Toilet/Urinal Care Products" were about 2.66 tons per day (tpd) (5,318 pounds per day) in California. Included within this total are PDCB products which contributed estimated VOC emissions of 2.48 tpd (4,964 lb/day), approximately 93 percent of the category emissions.

Table VI-19
Toilet/Urinal Care Product*

Product Form	Number of Products/Product Groups	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
All	266	56,578	5,318

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001b)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for toilet/urinal care products was 10%; staff believes the 2001 Survey covered 90% of the market.

Toilet/Urinal Care Products

Toilet/Urinal Care Products function in several ways. Some products are mounted in or connected to the bathroom fixtures and work automatically, while others are designed for periodic manual application to the fixtures. Some are cleaners that provide deodorizing benefits, while others are solely deodorizers with no cleaning function. Products are marketed in solid/gel, liquid, and to a very limited extent, aerosol, and pump spray forms.

"Blocks"

For use as automatic deodorizers and deodorizer/cleaners, Toilet/Urinal Care Products are mainly marketed in solid (block) form. Solid products used to mask restroom odors are packaged in a variety of ways. Blocks are available in both PDCB and non-PDCB formulations. These blocks are also available enclosed in a rubber or plastic screen.

PDCB and non-PDCB solid products are used interchangeably to primarily mask unpleasant odors in restrooms. PDCB blocks have been used worldwide for decades, and find use in all manner of restroom facilities including schools, offices, homes, outhouses and even aircraft lavatories.

PDCB is the main ingredient in many of the deodorizing blocks for toilet bowls and urinals. They provide a characteristic aroma that serves to mask unpleasant bathroom odors, but provide no cleaning function. A typical urinal block is simply placed in the urinal basin, where it sublimes and provides a masking odor. Subliming refers to a process where a substance converts directly from a solid to a gas phase, without going through a liquid phase. Screens are sometimes used to encase the block to minimize splash, trap debris that may clog drains, and may themselves be impregnated with fragrance. In fact, fragrance-impregnated screens without a block are sold as competitors to urinal blocks.

Toilet bowl deodorizers, as opposed to urinal deodorizers, are sold in a rim hanger cage. As with urinal deodorizers, solid toilet rim hanging deodorants come in PDCB and non-PDCB formulations.

Non-PDCB blocks generally provide some cleaning capability as well as masking odors. These products have gained substantial marketshare over the last decade, and are frequently advertised as environmentally friendly. Retailers frequently market both PDCB and non-PDCB blocks side by side. Sometimes products are dye color-coded to easily distinguish between the two. Red is typically the color-code for PDCB products, and blue typically for non-PDCB products. Marketers also refer to products as "para" and "non-para."

Non-PDCB toilet/urinal blocks are increasingly being viewed as more environmentally friendly than their PDCB competitors. As detailed in Chapter VII, PDCB is a potential human carcinogen, and as, such, the ARB is enacting an ATCM to prohibit the use of PDCB in toilet/urinal care products and air fresheners.

The ARB is not acting alone to prohibit use of PDCB. The City of Seattle prohibits the use of PDCB blocks in city owned and leased buildings, and purchases non-PDCB blocks as well as other "environmentally friendly" cleaning agents to protect their janitorial workers (Seattle 2004). Retailers advertise these products as "non-toxic," and "biodegradeable," while also touting their cleaning attributes such as removal of

hard water scale, uric acid and mineral deposits, and "keeps drain clean." (Central Stores, 2004).

Addressing health concerns regarding the use of PDCB in air fresheners, the New York State Assembly is presently considering approval of bill A09485, which bans the use of PDCB in restrooms accessible to the public. A retail janitorial supplier in New York reported that while five years ago PDCB blocks were the only urinal deodorizers sold, where now these blocks account for only about 20 percent of their sales (NY Post, 2003).

The City of Santa Monica has followed a similar path as New York and Seattle. Investigating complaints regarding odor in a public restroom, city staff concluded that PDCB toilet blocks are not effective in reducing odor. They felt the best solution was the use of enzyme cleaners paired with frequent, proper cleaning, especially for restrooms in high pedestrian traffic areas. Besides general odor complaints, the City received complaints specifically regarding the odor from the PDCB toilet blocks.

Moreover, California Proposition 65 requires that PDCB blocks sold for use in California confirm the warning: "This product contains a chemical that is known by the State of California to cause cancer." Online marketers frequently if not usually advertise both the PDCB blocks and non-PDCB blocks side by side, with both getting fairly equal advertisement space and clearly competing with each other.

The PDCB blocks generally cost less than their non-PDCB counterparts, as little as half as much, but substantial overlap in price was seen, especially when the blocks were sold contained within a urinal screen. A review of online retailers reveal a typical PDCB 12 pack of four ounce blocks, each which will last for 30 days, with prices in the $5 to $8 range. Comparable prices for the non-PDCB block, albeit with screen included, average $17 for a 12 pack with each individual block also lasting for about 30 days.

Rim hanging blocks showed similar prices differentials, with a PDCB 12 pack selling for about $9 and a non-PDCB 12 pack selling for about $18. The price for non-PDCB blocks, though, is not always higher, with some manufacturers selling PDCB blocks saturated with an alternate fragrance such as cherry and contained within a screen in the $20 range for a 12 pack. Enzyme-containing non-PDCB blocks tend to be the most expensive, with prices running in the $25 range for a 12 pack.
(Total Office Supply, 2004, Twin Supply, 2004, Keysan, 2004, CJMS, 2004, Business Supply, 2004, Shoplet, 2004).

"Other Products"

Another type of automatic product is used inside the toilet's water tank. These products are generally placed on the bottom right side of the tank (away from the water valve mechanisms generally at the left), and provide cleaning chemicals and other ingredients as flush water travels from the tank to the bowl below. Most of the "in-toilet-

tank" products are sold as solids. Liquid products use bottle dispensers that are hung to the tank. Though different, "in-toilet-tank" products may be viewed as indirect alternatives to the block products used in toilet bowls. Products that clean inherently provide deodorizing benefits.

The main type of manual product is the familiar plastic squeeze bottle containing liquid cleaner. The product is dispensed by inverting the bottle, so the bottle tip can access and dispense liquid (or thick liquid) to underneath the toilet bowl rim and to other bowl areas to be cleaned. The liquid may be left with the contents of the bowl for several minutes. A manual brush, small mop, or other device is then used to scrub the bowl. The last step is to drain the contents of the bowl by flushing the toilet. For urinals, manual products are used in a similar way. Although very different, the manual cleaning products may be viewed as indirect alternatives to the block products. Products that clean inherently provide deodorizing benefits.

Miscellaneous products include sophisticated automatic dispensing systems used in high-traffic public or commercial restrooms, and products for portable toilets and urinals. The automatic dispensing systems may include an external container and liquid-product delivery tube, either to the bowl of the toilet or urinal, or into plumbing that provides flush water. The most advanced systems use infra-red sensors for "touchless" automatic flushing and product dispensing, as toilet/urinal users depart. Automatic flushing devices help alleviate odors from the fixtures caused by otherwise "no-flush" users. (Jolicoeur, 1999).

Products for portable toilets and urinals are sold in concentrated liquid form. The products are added to and diluted by water in the holding tank, to the recommended dilution ratio.

Toilet/urinal care products are available at stores for general consumers and for janitorial supplies.

Product Formulation:

Automatic Products -- In-Toilet-Bowl and In-Urinal

PDCB products are traditionally comprised of over 98 percent PDCB. Small amounts of colorant and other fragrances are frequently added, making up the remaining one to two percent. PDCB dominated the market in this category for years. PDCB is a subliming solid at room temperature (converts directly from a solid to a gas phase, without going through a liquid phase). It is easily packaged into cakes, and sublimes with a characteristic sweet odor such that a four ounce block will typically last about 30 days. It is nearly insoluble in water, which prevents it from rapidly dissolving in the waste stream. However, we have determined that approximately 20 percent of the mass of PDCB toilet blocks has a waste water fate, and is found in influent levels at Publicly Owned Treatment Works (see Chapter VII, section 4). The compound is the product, so little money is required to formulate or manufacture the blocks.

The alternative, non-PDCB toilet/urinal blocks require additional formulation while their PDCB counterparts do not. This in part explains their higher cost. A typical non-PDCB block is a mixture of an inorganic surfactant/salt, i.e. sodium sulfate, borax, along with a gelling agent such as high molecular weight polyethylene glycol to mix with the inorganic and form a block. These high molecular weight hydrophilic compounds are slow to dissolve, so bowl residence time is about the same for both PDCB and non-PDCB blocks. Into this matrix, both non-ionic and ionic surfactants may be added to provide cleaning. In this capacity, cleaning is synergistic with odor combating, since residues that build up in the basins are responsible for much of the malodors. Fragrances are also added, as are dyes to provide pleasing counter-aromas and color.

These competing products, being surfactant/gel based, have much lower emissions and yet these products fulfill the same deodorizing function. A four ounce non-paradichlorobenezene toilet block is also advertised to similarly last about 30 days, but along with providing a masking aroma, also adds cleaning ability.

More advanced cleaning and odor-fighting ability may be added to non-PDCB blocks by adding enzymes that break down residues, or live bacterial suspensions that actively do the same. These products tend to be more expensive than simpler formulations.

The "in-toilet-bowl" products also include several liquid products. These typically include a small liquid container/dispensing unit and a hanger. The products are mounted on the toilet bowl rim the same way the blocks are used. For automatic cleaning and deodorizing, liquid product is gradually dispensed into the bowl, based on water flow from the flushing action.

Automatic Products -- In-Toilet-Tank

Typical ingredients used include surfactants, sodium sulfate, baking soda, carbamide, bleach, dye, and fragrance. The majority of in-toilet-tank products are low-VOC (2.1 percent VOC sales-weighted-average) and generally comply with the proposed 3 percent VOC standard for non-aerosol products. Products needing reformulation have the option of reducing the level of fragrance.

Manual Products

The manual products are generally cleaners with low levels of fragrance. Hydrogen chloride is a common active ingredient. Some products are formulated as disinfectants with quaternary ammonium compounds. The vast majority of non-aerosol manual products are low VOC (0.04 percent VOC sales-weighted-average) and generally comply with the proposed 3 percent VOC standard for non-aerosol products. The very few products needing formulation have the options of reducing VOC ingredients, such as alcohol, glycol ether, or fragrance, or converting to a formulation similar to the complying products.

Other Products

The external dispenser products contain ingredients to counteract odor causing substances in toilets and urinals, and are generally low-VOC (1.1 percent VOC sales-weighted-average). Most products already comply with the proposed 3 percent VOC standard for non-aerosol products, but a limited number of products would need to reformulate. Reformulation options include decreasing the use of alcohol, glycol ethers, or fragrance, or converting to a formulation similar to one of the complying products.

The concentrate liquid products for portable toilets use various ingredients to counteract odor. Some use biologically active ingredients (friendly bacteria, enzymes). Alcohol is used to a limited extent. Some products contain fragrance. The strength of the fragrance may be varied by the dilution ratio. When diluted, the products generally comply with the proposed VOC standard of 3 percent for non-aerosol products.

Proposed VOC Limit and Compliance:

Toilet/Urinal Care Product

The proposed VOC standards for "toilet/urinal care products" are 10 percent by weight for "aerosol" products, and 3 percent by weight for "non-aerosol" products. The proposed effective date is December 31, 2006. As shown in Table VI-20, using adjusted 2001 emissions, the proposed standards for "toilet/urinal care products" will result in an estimated emission reduction of 4,951 pounds per day or 2.48 tons per day.

Table VI-20
Toilet/Urinal Care Product Proposal *

Product Form	Proposed VOC Limit (wt. %)	Complying Products/ Product Groups	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Aerosol	10	Protected Data	Protected Data	Protected Data
Non-Aerosol	3	202	88	4,951

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001b)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for toilet/urinal care products was 10%; staff believes the 2001 Survey covered 90% of the market.

Compliance with the proposal will not be difficult. Numerous non-PDCB Toilet/Urinal Care Products are already available and well accepted by consumers. In fact, survey data show that 88 percent of the market already complies with the proposed 3 percent limit for non-aerosol forms of Toilet/Urinal Care Products. Non-complying toilet/urinal will need to follow the alternative non-PDCB formulation strategies described above under Product Formulations. Aerosol products are in compliance with the proposed limit of 10 percent VOC by weight.

SOLID/GEL ROOM AIR FRESHENERS

Sales and Emissions

The 2001 Survey did not cover the entirety of the solid air freshener category. Emissions from solid/gel air fresheners not used in toilet/urinal care were not included. Thus to estimate VOC emissions, staff used the following data: the 1990 U.S. EPA Survey (U.S. EPA Report to Congress); the 1997 Consumer and Commercial Products Survey; the 2001 Consumer and Commercial Products Survey; and the Chemical Market Reporter, 1999. By estimating VOC emissions based on these data, staff is able to quantify the ancillary VOC reduction benefit resulting from the proposal to prohibit use of PDCB in air fresheners.

A. 1990 U.S.EPA Consumer and Commercial Products Survey

Data from the 1990 U.S. EPA survey showed total California emissions of solid air fresheners containing PDCB at 3.0 tpd, as shown below.

Non-Toilet/Urinal Solid Air Freshener PBD Emissions	0.5 tpd
Toilet/Urinal Deodorant Block PDCB Emissions	2.3 tpd
Market Coverage Estimate	90 percent
1990 Total Estimated California Solid Air Freshener PDCB	**3.0 tpd**

B. 1997 ARB Consumer and Commercial Products Survey

Although market coverage was low, the 1997 ARB survey showed emissions of 1.9 tpd for solid air fresheners containing PDCB (see below).

Solid Air Freshener PDCB Emissions	**1.9** tpd
Solid Air Freshener Total Emissions	2.6 tpd

(poor market coverage in this category)

C. 2001 ARB Consumer and Commercial Products Survey

Our 2001 ARB survey covered a portion of the solid air fresheners containing PDCB market that were included in toilet/urinal care product emissions. Total Toilet/Urinal Care Products PDCB Emissions were 2.5 tpd.

D. Manufacturing estimates presented in the *Chemical Market Reporter, 1999*.

These survey data are supplemented by the *Chemical Market Reporter, 1999*. In this journal room deodorants represented 25 percent of the use of all PDCB manufactured. Total U.S. demand for PDCB in 1999 was 93 million pounds. Correcting for import/export using ratios from 2000 (7.4 million imported, 27.1 million exported, ITA, 2001), PDCB use for room air fresheners in California is 3.1 tons per day for 1999.

As shown above, approximately 0.6 tons per day of PDCB was used for non-toilet air freshening using 3.1 tpd of total emissions (Chemical Market Reporter) and 2.5 tpd from the 2001 Survey, and assuming fairly stable market. This ratio, 0.6/3.1, for current non-toilet PDCB use is consistent with the ratio shown from the 1990 U.S. EPA data of 0.5/3.0.

Staff concludes based on the foregoing, that VOC emissions from PDCB-based solid/gel air fresheners not used in toilet/urinal care, are 0.6 tpd.

Product Use and Marketing:

Although the size, shape, and mounting methods may differ, the current PDCB room "air fresheners" used as space deodorizers are otherwise very similar to the PDCB toilet/urinal blocks, with essentially the same chemical composition. The PDCB room "air fresheners" include blocks mounted on walls and blocks placed at counters. The PDCB products compete with traditional room air fresheners such as metered dose products, gels, fragrance pearls and potpourri. Some of the non-PDCB products are used in essentially the same way as the PDCB products. Solid/gel room air fresheners are available at stores for general consumers and for janitorial supplies.

Product Formulation

As previously discussed, the PDCB room "air fresheners" are formulated essentially the same as the PDCB blocks for toilets and urinals. PDCB products are traditionally comprised of over 98 percent PDCB. Small amounts of colorant and other fragrances are frequently added, making up the remaining one to two percent.

The non-PDCB "air fresheners" are not affected by the proposal, other than being viewed as potential alternative products with considerably lower VOC emissions.

Proposal and Compliance for Solid/Gel Room Air Fresheners

Staff is proposing to remove two previously provided exemptions contained in the Regulation. The first provision described in section 94510(g), exempted air fresheners containing at least 98 percent PDCB from compliance with the VOC limit contained in section 94509(a). The second provision, section 94510(f), excluded air fresheners comprised entirely of fragrance and/or compounds not defined as VOCs from compliance with the VOC limits, as well.

Removal of these exemptions, and specifically prohibiting the use of PDCB in air fresheners (through the ATCM, see Chapter VII) or as a fragrance, would eliminate PDCB air fresheners from the California market. The market will need to use non-PDCB products that meet the current VOC limit of 3 percent by weight. As detailed above, as a result of the proposed ATCM, staff estimates a VOC emission reduction benefit from solid air fresheners (not used in toilets and urinals), would be about 0.57 tons per day.

Compliance Methods

Numerous non-PDCB room Air Fresheners have been complying with a 3 percent by weight limit since January 1, 1993. Thus, the only solid/gel Air Fresheners that would not comply are those comprised of PDCB. Because the proposed ATCM will prohibit use of air fresheners containing PDCB, these products will be replaced by other non PDCB air fresheners.

EFFECT OF COMBINED PROPOSALS

In this chapter we have described the ancillary VOC emission reduction benefits that would be achieved from implementation of the proposed ATCM for PDCB. In addition to the predicted reduction in excess cancers (9 excess chances per million persons) that would be achieved through adoption of the proposed ATCM, the ATCM will also result in VOC reductions from the toilet/urinal care products of about 2.7 tpd, about 2.3 tpd of which are PDCB and 0.4 tpd of other VOCs. A further VOC reduction of about 0.4 tons per day would be achieved from the solid/gel room air fresheners, all of which is PDCB. In total, a VOC reduction of about 3.1 tpd would be achieved, 2.7 tpd of which would be PDCB.

Issues:

1. **Issue:** Some manufacturers of PDCB toilet blocks argue that given the low reactivity of PDCB, replacement fragrances from the non-PDCB products may actually form more ground level ozone given their higher reactivity. Thus, while generating an environmental benefit by reducing direct human exposure to PDCB, ARB is worsening the ozone problem and should not be claiming VOC reduction benefits.

Response: See discussion in Chapter IX, section D.

2. **Issue:** The amount of fragrance provided by PDCB air fresheners can not be matched by alternative products, resulting in ineffective odor masking.

Response: The ARB is claiming reductions of 0.4 tpd from the non-toilet/urinal air fresheners. We justify this claim based on the VOC content of competing products as well as the very high odor threshold of para-dichlorobenzene. The odor threshold for para-dichlorobenzene is about 90 mg/m3. Common indoor air fresheners such as limonene has an odor threshold of 0.01 – 0.05 mg/m3. Terpenes such as a-pinene, the fragrance of pine, has an odor threshold of 0.84 mg/m3. Aldehyde, active moieties on many fragrant compounds, frequently have odor potencies less than 1 mg/m3. In other words, common fragrances are potent at significantly lower atmospheric concentrations. For this reason, a 5 percent VOC (fragrance exemption applied) non-PDCB air freshener can compete directly with a PDCB product in terms of odor masking ability. We expect the PDCB eliminated from air fresheners to be replaced by more reactive fragrances, but used at significantly lower atmospheric concentrations, leading to net ozone reductions.

REFERENCES

Air Resources Board. Consumer Products Regulation. Title 17 CCR section 94510(g). *(paradichlorobenzene exemption)* (ARB, 2001a)

Air Resources Board. 2001 Consumer and Commercial Products Survey. September 24, 2002 (ARB, 2001b)

Air Resources Board. Consumer Products Regulation. Title 17 CCR section 94510(c). *(2 percent fragrance allowance)* (ARB, 2001c)

Air Resources Board. Initial Statement of Reasons for the Proposed Amendments to the Regulation for Reducing Volatile Organic Compound Emissions from Aerosol Coating Products and Proposed Tables of Maximum Incremental Reactivity (MIR) Values, and Proposed Amendments to Method 310, Determination of Volatile Organic Compounds in Consumer Products. May 5, 2000. (ARB, 2000)

Business Supply, 2004. Internet Advertisement for Toilet/Urinal Blocks. http://www.businesssupply.com/dept/2030403/big-d-4-oz-para-urinal-block.html (Business Supply, 2004)

Central Stores, 2004. Internet Advertisement for Toilet/Urinal Blocks. http://www.ga.wa.gov/centralstores/ (Central Stores, 2004)

Chemical Marketing Reporter, 1999. "Chemical Profile for P-dichlorobenzene." http://www.findarticles.com/cf_dls/m0FVP/23_255/54841428/p1/article.jhtml June 7, 1999. (Chemical Market Reporter, 1999)

City of Seattle. Correspondence with Shirli Axelrod on Purchasing Policies for Seattle Public Utilities. May 3, 2004. (Seattle, 2004)

City of Seattle. "City Of Seattle Environmental Criteria for Janitorial Products." January 18, 2000. http://www.cityofseattlenet (Seattle, 2000)

City of Seattle. Request for Proposal #JCT-022502 for Environmental Preferable Janitorial Cleaning Products. 4/16/2002 (Seattle, 2002)

CJMS, 2004. Internet Advertisement for Toilet/Urinal Blocks. http://www.cjms.com/deodorizers.html (CJMS, 2004)

Fire Department New York. Air Quality Assessment Survey - for property located at: 252 Lorraine Street - Brooklyn, NY - within the: Basement to Roof. Prepared by GC/Environmental Advisory, Inc. for Fire Department New York - 9 Metrotech Center - Brooklyn, NY 11201. March 19, 2003. (FDNY, 2003)

Jolicoeur, P., McDermott, J., and Whartnaby, E. Selling Systems for Cleanliness - and Profit. *Maintenance Supplies* 44(8), pp 29-33. August 1999. (Jolicoeur, 1999)

Keysan, 2004. Internet Advertisement for Toilet/Urinal Blocks and other Air Fresheners. http://www.keysan.com/ksuai19.htm (Keysan, 2004)

New York Post. Toxic-Block Syndrome Spurs FDNY Toilet Switch. December 21, 2003, page 2. Sam Smith *New York Post - Online Edition.* http://pqasb.pqarchiver.com/nypost/513297131.html (NY Post, 2003)

New York State Assembly. http://assembly.state.ny.us (bill A09485)

Shoplet, 2004. Internet Advertisement for Toilet/Urinal Blocks. http://www.shoplet.com/office/cgi-bin/mrocategories.cgi?catid=1013&sid=10270 (Shoplet, 2004)

TwinSupply, 2004. Internet Advertisement for Toilet/Urinal Blocks. http://twinsupply.com/itemkryu04.html (TwinSupply, 2004)

K. Wood Cleaner

Product Category Description:

Wood Cleaners are specialty cleaning products designed and labeled exclusively to clean wooden materials including but not limited to decking, fences, flooring, logs, cabinetry, and furniture. Non-aerosol products are usually designated for either indoor or outdoor use while the aerosols are primarily used indoors. Wood Cleaners do not "clean and polish" or leave any protective finish on the surface. Products with these attributes are already regulated as "Furniture Maintenance Products." In fact, home-use products are often designed to remove waxy buildup due to repeated furniture polishing. Wood Cleaner products also do not include dusting aids, which are also regulated as a separate category. Wood Cleaners are mainly found in liquid form but can also be purchased as an aerosol or solid.

Table VI-21 below summarizes the sales and emissions from Wood Cleaners based on the results of the ARB's 2001 Consumer and Commercial Products Survey (ARB, 2001). As shown in Table VI-21, Wood Cleaners are sold in both the aerosol and non-aerosol forms, with the non-aerosols dominating the market, with over 92 percent of the reported sales. Wood Cleaners have an estimated VOC emission of about 0.279 tons per day (558 pounds per day) in California.

Table VI-21
Wood Cleaner*

Product Form	Number of Products/ Product Groups	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Aerosol	4	424	106
Non-aerosol	40	5,014	452
Total	**44**	**5,438**	**558**

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for wood cleaner products was 10%; staff believes the 2001 Survey covered 90% of the market.

The aerosol products in this category had a sales-weighted average VOC (SWA-VOC) content of 25.7 percent, by weight, with a SWA-MIR (Maximum Incremental Reactivity) value of 0.29 tons ozone per ton product. The Ozone Forming Potential (OFP) of these aerosols was 22.3 tons ozone per year. The non-aerosols had an SWA-VOC of 9.1 percent, an SWA-MIR of 0.165 tons ozone per ton product, and an OFP of 151.4 tons ozone per year.

Product Use and Marketing:

The wood cleaner category consists of aerosol and non-aerosol cleaning products that are designed for cleaning surfaces made of wood. Non-aerosol products are most commonly used on floors, patios, and decks while aerosol products are used on all surfaces made of wood, usually furniture and cabinetry.

Non-aerosol wood cleaners are designed for use on either exterior or interior surfaces. The product is normally diluted, applied to a soiled surface and allowed to set for a few minutes. The surface is then cleaned off with a cloth, mop, abrasive sponge, or rinsed off and allowed to dry. The use of a cloth or abrasive sponge normally depends on the severity of the soil to be removed. Non-aerosol deck washes are added with a mechanical sprayer or water hose, allowed to set, then rinsed off. (Procter, 2003) Aerosol wood cleaners are used similarly but appear to be tailored to indoor use.

Wood Cleaners are sold to household consumers, commercial, and industrial establishments in both aerosol and non-aerosol forms. Non-aerosol products can be found at janitorial, convenience stores, warehouse, supermarkets, and hardware stores. Aerosol products are likely to be found at supermarkets and convenience stores.

Product Formulation:

Non-aerosol wood cleaners are primarily near zero water-based formulations. A typical formulation includes water with a small amount of an exempt and/or an inorganic compound. Various glycol ethers are also used. Solvent-based non-aerosol

formulations normally consist of hydrocarbon solvent and exempt compounds. Aerosol wood cleaners consisted mainly of mineral spirits, hydrocarbon propellant, and sometimes water. (Survey, 2001)

Proposed VOC Limit and Compliance:

The proposed VOC limit for Wood Cleaner is 17 percent by weight (aerosol) and 4 percent by weight (non-aerosol), effective December 31, 2006. As shown in Table VI-22, using adjusted 2001 emissions, the proposed limit will result in an estimated emission reduction of 458 pounds per day or 0.23 tons per day.

Table VI-21also shows that 90 percent of the market currently complies with the proposed 4 percent VOC limit. This category is dominated by deck washes and similar exterior wood surface cleaners. Because these products are near zero, if not zero VOC, there is a high complying marketshare at any limit. However, products to be used indoors have a higher VOC content and need to have a small amount of VOC to be effective. (Procter, 2004) It is also important to note that the mechanical force of the spray when using a sprayer or water hose aids in the effectiveness of some of these outdoor use products. There are no complying aerosol products.

Table VI-22
Wood Cleaner Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products/ Product Groups	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Aerosol	17	0	0	34
Liquid	4	32	90	424
Total				**458**

* Based on 2001 Consumer and Commercial Products Survey. (ARB, 2001)

** Survey emissions adjusted for complete market coverage (see Chapter IV, Emissions). The market coverage adjustment for wood cleaner products was 10%; staff believes the 2001 Survey covered 90% of the market.

The proposed 17 percent VOC limit for aerosol, and 4 percent VOC limit for non-aerosol are designed to make the Regulation consistent with previously regulated categories. The aerosol limit for this category is consistent to that of the Furniture Maintenance Product, which contains similar products while the non-aerosol limit is consistent to that of a General Purpose Cleaner.

Reformulation options that can be used by manufacturers to meet the proposed limit include the use of water, LVP-VOC hydrocarbon solvents, glycol ethers, as well as dibasic esters. Each of these alternatives provides the solvency necessary to allow for substitution, since dry time is not an issue. Because the product is normally wiped with some form of cloth or sponge or rinsed with water after usage, slow evaporation and slight residue should not be an issue in this category. Reformulating to the proposed

limits is technically feasible. The majority of the products in this category are already water-based, and there are many viable non-VOC alternatives available for substitution.

Issues: There were so significant issues with this category.

REFERENCES

Air Resources Board. 2001 Consumer and Commercial Products Survey. September 24, 2002. (ARB, 2001)

Procter & Gamble. ARB presentation. February 11, 2004 (Procter, 2004)

Procter & Gamble. Product Label. August 20, 2003 (Procter, 2003)

SC Johnson. Product Label. August 20, 2003 (SC Johnson, 2003)

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:

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

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.

REFERENCES

Aerosol 101 Industry Presentation. Propellant Summary. Slideshow Presentation to ARB Consumer Products Staff, August 2002.

Air Resources Board, Technical Support Document. Proposed Regulation to Reduce Volatile Organic Compound Emissions from Antiperspirants and Deodorants. September 1989a, Appendix C, pp. C.1-C.62. (ARB, 1989a)

Air Resources Board and the California Air Pollution Control Officers Association. Suggested Control Measure for Architectural and Industrial Maintenance (AIM) Coatings. Staff Report, 1989b. (ARB, 1989b)

Air Resources Board, Technical Support Document. Proposed Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products. August 1990, pp. 67-71 and Appendix E. (ARB, 1990)

Air Resources Board, Technical Support Document. Proposed Amendments to the Statewide Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products - Phase II. October 1991, pp. VI.1-VI.6 and Appendix D. (ARB, 1991)

Air Resources Board, Staff Report. Proposed Alternative Control Plan for Consumer Products. August 1994, pp. III.3-III.5 and VI.8-VI.24. (ARB, 1994)

Air Resources Board. Initial Statement of Reasons for a Proposed Statewide Regulation to Reduce Volatile Organic Compound Emissions from Aerosol Coating Products and Amendments to the Alternative Control Plan for Consumer Products. February 3, 1995, Volume II, pp. VIII.1-VIII.20, X.1-X.13 and Appendix G. (ARB, 1995)

Air Resources Board. Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation. June 6, 1997, Volume II, Chapter VIII, pp. 1-27, *("Mid-term Measures I").* (ARB, 1997)

Air Resources Board. Initial Statement of Reasons for Proposed Amendments Pertaining to Hairspray in the California Consumer Products Regulation. February 7, 1997, Volume II, pp. 44-59. (ARB, 1997a)

Air Resources Board. Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation. September 10, 1999, Volume II, pp. 196-221, *("Mid-term Measures II").* (ARB, 1999)

California Prison Industry Authority, On-Line Catalog. http://catalog.pia.ca.gov/onlinecat/catalog.php (PIA, 2004)

Chemical Market Reporter. Chemical Prices A-Z. http://chemicalmarketreporter.com April 5, 2004. (CMR, 2004a)

Chemical Market Reporter. Chemical Profile for Chlorobenzene. http://chemicalmarketreporter.com April 5, 2004. (CMR, 2004b)

Chemical Engineering, April 1997, January 2002, March 2004.

Comet Chemical Company Ltd. Bulk Price Sheet. http://www.cometchemical.com/prices.htm April 18, 2004.

Praxair Worldwide. USA Price Schedule. Facsimile to ARB Staff, April 28, 2004.

Science Lab.com-Chemicals & Laboratory Equipment. Listing of Chemicals A-Z. http://www.sciencelab.com April 20, 2004.

Table VIII-2
Estimated Total Impacts to Businesses from Both Annualized Non-Recurring and Annual Recurring Costs

Table VIII-2. Estimated Total Impacts to Businesses from Both Annualized Non-Recurring and Annual Recurring Costs

Category	Estimated # Products Non-Compliant	Number of Companies with Noncompliant Products in Each Product Category	Estimated Annual Costs, Dollars Per Year (Includes Recurring and Nonrecurring) — For a Typical Business in the Product Category: Low Cost	High Cost	Mid Cost	For All Businesses in the Product Category: Low Cost	High Cost	Mid Cost
Adhesives								
Contact Adhesive								
General Purpose	9	8	$1,669	$1,757	$1,713	$13,353	$15,615	$14,484
Special Purpose (labeling only)****	13	4	$487	$2,498	$1,492	$1,949	$9,990	$5,970
Total	22	12				$15,302	$25,605	$20,454
Household Care								
Adhesive Remover								
Gasket or Thread Locking Adh. Rem.	18	9	$3,942	$16,483	$10,212	$35,474	$290,875	$163,174
Floor & Wall Covering Adh. Remover	22	11	$4,085	$26,622	$15,353	$44,934	$595,081	$320,007
General Purpose Adhesive Remover	46	22	$4,192	$21,134	$12,663	$92,233	$969,679	$530,956
Specialty Adhesive Remover	19	9	$4,204	$31,890	$18,047	$37,839	$600,278	$319,058
Air Freshener**	37	4	$18,695	$69,681	$44,188	$74,779	$2,592,122	$1,333,451
Antistatic Product								
Aerosol	6	7	$1,689	$4,914	$3,302	$11,825	$28,907	$20,366
Non-aerosol*	0	0	n/a	n/a				
Electrical Cleaner	73	18	$8,190	$10,449	$9,319	$147,414	$766,274	$456,844
Electronic Cleaner	66	18	$7,321	$27,953	$17,637	$131,780	$1,832,490	$982,135
Fabric Refresher								
Aerosol	20	7	$5,743	$16,708	$11,226	$40,204	$334,162	$187,183
Pump Spray, liquid, solid	20	7	$5,743	$8,354	$7,049	$40,204	$167,081	$103,643
Footware or Leather Care Product								
Aerosol	7	4	$3,542	$9,329	$6,435	$14,168	$62,193	$38,180
Solid	7	5	$3,048	$7,434	$5,241	$15,241	$49,560	$32,401
All Other Forms	54	18	$6,080	$16,030	$11,055	$109,444	$872,727	$491,085
Graffiti Remover								
Aerosol	41	18	$4,783	$18,160	$11,472	$86,094	$747,783	$416,938
Non-aerosol	31	19	$3,236	$10,297	$6,767	$61,488	$314,970	$188,229
Toilet/Urinal Care								
Aerosol*	0	0	n/a	n/a	n/a	$0	$0	$0
Non-Aerosol	59	34	$3,482	$40,082		$118,378	$2,360,375	$1,239,377
Wood Cleaner								
Aerosol	4	4	$2,234	$6,092	$4,163	$8,934	$27,073	$18,004
Non-aerosol	9	11	$1,624	$4,283	$2,953	$17,868	$38,067	$27,968
Total	538	225				$1,088,301	$12,649,696	$6,868,999
Personal Care								
Hair Styling Product								
Aerosol/Pump Spray	41	21	$3,225	$7,883	$5,554	$67,723	$324,599	$196,161
All Other Forms	94	23	$6,730	$16,452	$11,591	$154,796	$1,548,398	$851,597
Shaving Gel-Tier 1	14	3	$7,740	$31,819	$19,779	$23,219	$449,211	$236,215
Shaving Gel-Tier 2	31	9	$37,729	$119,538	$78,634	$339,564	$3,656,462	$1,998,013
Total- SG Tier 1	149	47				$245,738	$2,322,209	$1,283,974
Total- SG Tier 2	166	53				$585,302	$5,978,671	$3,281,987
Grand Total-SG Tier 1	710	284				$1,349,342	$14,997,511	$8,173,426
Grand Total-SG Tier 2	727	290				$1,934,644	$20,976,182	$10,171,439

* 100% of the market reported in survey complies with the proposed standard

** The data used for Air Fresheners was the latest available data, which was from the 1997 Consumer Products Survey.

Table VIII-5. Estimated Total Annualized Non-Recurring Fixed Cost to Comply with Proposed Standards

Category	Proposed Limit	Market Covered (% covered by	Market Adj. Factor	Estimated # Products Non-compliant* (A)	Estimated Total One-Time Cost to Reformulate Per Product (dollars) Low (B0)	High (B1)	Estimated Annualized Cost to Reformulate Product (dollars per year) Low (B2 =B0 x CRF)	High (B3 =B1 x CRF)	Estimated Annualized Fixed Cost to Reformulate All Non-Compliant Products (dollars per year) Low(AxB2)	High (AxB3)
Adhesives										
Contact Adhesive										
General Purpose	55	90	1.11	9	$8,534	$8,534	$1,389	$1,389	$12,345	$12,345
Special Purpose (labeling only)****	80	90	1.11	13	$898	$4,604	$146	$749	$1,949	$9,990
			Sum	22					$14,295	$22,336
Household Care										
Adhesive Remover										
Gasket or Thread Locking Adh. Rem.	50	85	1.18	18	$12,352	$51,653	$2,010	$8,406	$35,474	$148,346
Floor & Wall Covering Adh. Remover	5	85	1.18	22	$12,352	$51,653	$2,010	$8,406	$44,934	$187,905
General Purpose Adhesive Remover	20	85	1.18	46	$12,352	$51,653	$2,010	$8,406	$92,233	$385,700
Specialty Adhesive Remover	70	85	1.18	19	$12,352	$51,653	$2,010	$8,406	$37,839	$158,236
Air Freshener***	3	n/a	1.20	37	$12,352	$46,038	$2,010	$7,493	$74,779	$278,723
Antistatic Product										
Aerosol	80	85	1.18	6	$12,352	$35,932	$2,010	$5,848	$11,825	$34,399
Non-aerosol**	11	85	1.18	0	$12,352	$35,932	$2,010	$5,848	$0	$0
Electrical Cleaner	45	90	1.11	73	$12,352	$15,720	$2,010	$2,558	$147,414	$187,618
Electronic Cleaner	75	90	1.11	66	$12,352	$47,161	$2,010	$7,675	$131,780	$503,158
Fabric Refresher										
Aerosol	15	70	1.43	20	$12,352	$35,932	$2,010	$5,848	$40,204	$116,957
Pump Spray, liquid, solid	6	70	1.43	20	$12,352	$17,966	$2,010	$2,924	$40,204	$58,478
Footware or Leather Care Product										
Aerosol	75	90	1.11	7	$12,352	$33,687	$2,010	$5,482	$13,401	$36,549
Solid	55	90	1.11	7	$12,352	$32,564	$2,010	$5,300	$13,401	$35,331
All Other Forms	15	90	1.11	54	$12,352	$32,564	$2,010	$5,300	$109,444	$288,534
Graffiti Remover										
Aerosol	50	85	1.18	41	$12,352	$48,284	$2,010	$7,858	$82,773	$323,566
Non-aerosol	30	85	1.18	31	$12,352	$39,301	$2,010	$6,396	$61,488	$195,645
Toilet/Urinal Care										
Aerosol**	10	90	1.11	0	$12,352	$123,518	$2,010	$20,102	$0	$0
Non-Aerosol	3	90	1.11	59	$12,352	$93,200	$2,010	$15,168	$118,378	$893,217
Wood Cleaner										
Aerosol	17	90	1.11	4	$12,352	$33,687	$2,010	$5,482	$8,934	$24,366
Non-aerosol	4	90	1.11	9	$12,352	$32,564	$2,010	$5,300	$17,868	$47,108
			Sum	538					$1,082,374	$3,903,836
Personal Care										
Hair Styling Product										
Aerosol/Pump Spray	6	85	1.18	41	$10,106	$24,704	$1,645	$4,020	$67,723	$165,546
All Other Forms	2	85	1.18	94	$10,106	$24,704	$1,645	$4,020	$154,796	$378,390
Shaving Gel (aerosol)- Tier 1	7	85	1.18	14	$10,106	$41,547	$1,645	$6,762	$23,219	$95,457
Shaving Gel (aerosol) - Tier 2	4	85	1.18	31	$10,106	$93,200	$1,645	$15,168	$50,309	$463,958
			Sum	180					$296,047	$1,103,350

2003 Chemical Engineering Plant Cost Index =	405.7	(Prelim 12/03)	Discount Rate	10.00%	Grand Annual Total (dollars per year)	$1,392,716	$5,029,522
1991 Chemical Engineering Plant Cost Index =	361.3	(Final 1991)	Project Horizon, yrs	10		
			Cost Recovery Factor	0.16275		

* # Noncompliant Products = Market Adj. x (# Noncompliant Products in Survey)
** 100% of the market complies with standard
*** The data used for Air Fresheners was the latest available data, which was from the 1997 Consumer Products Survey.
**** Although 100% of the market complies with the standard, all products will incur a relabeling cost

Table VIII-5
Estimated Total Annualized Non-Recurring Fixed Cost to Comply with Proposed Standards

Table VIII-7. Estimated Impacts to Raw Materials Cost Per Unit

Category	Estimated Raw Material Costs, $/Unit of Product					
	Baseline Pre-Regulatory		Compliant		Cost Difference from Baseline Pre-Reg	
	Low (A0)	High (B0)	Low (A1)	High (B1)	to Low (A1)-(A0)	to High (B1)-(B0)
Adhesives						
Contact Adhesive						
General Purpose	0.28	0.50	0.31	0.55	0.03	0.05
Special Purpose*	n/a	n/a	n/a	n/a	0.00	0.00
Household Care						
Adhesive Remover						
Gasket or Thread Locking Adh. Rem.	0.37	0.37	1.14	1.14	0.77	0.77
Floor & Wall Covering Adh. Remover	1.94	2.57	0.39	3.91	0.00	1.34
General Purpose Adhesive Remover	0.18	0.49	0.37	0.39	0.19	0.00
Specialty Adhesive Remover	0.37	1.34	0.72	0.92	0.35	0.00
Air Freshener	0.68	0.71	0.28	0.56	0.00	0.00
Antistatic Product						
Aerosol	0.21	0.20	0.14	0.21	0.00	0.01
Non-aerosol*	n/a	n/a	n/a	n/a	0.00	0.00
Electrical Cleaner						
Aerosol	0.24	0.25	0.24	0.25	0.00	0.00
Non-aerosol	3.85	3.85	3.51	3.51	0.00	0.00
Electronic Cleaner						
Aerosol	0.24	0.24	0.11	0.21	0.00	0.00
Non-aerosol	3.85	3.85	2.99	2.99	0.00	0.00
Fabric Refresher						
Aerosol	0.22	0.19	0.39	0.34	0.17	0.15
Pump Spray	0.41	0.69	0.33	0.61	0.00	0.00
Solid	6.73	13.31	6.64	13.08	0.00	0.00
Liquid	0.64	1.25	0.47	0.89	0.00	0.00

* 100% of products comply with proposed limit, 0 cost to reformulate

Table VIII-7
Estimated Impacts to Raw Materials Cost Per Unit (continued)

Table VIII-7. Estimated Impacts to Raw Materials Cost Per Unit (continued)

Category	Estimated Raw Material Costs, $/Unit of Product					
	Baseline Pre-Regulatory		Compliant		Cost Difference from	
	Low (A0)	High (B0)	Low (A1)	High (B1)	to Low (A1)-(A0)	to High (B1)-(B0)
Footware or Leather Care Product						
Aerosol	0.07	0.07	0.08	0.08	0.01	0.01
Solid	0.09	0.17	0.09	0.17	0.00	0.00
Liquid	0.15	0.19	0.08	0.12	0.00	0.00
Semi-Solid	0.10	0.18	0.09	0.18	0.00	0.00
Graffiti Remover						
Aerosol	0.31	0.31	0.36	0.36	0.05	0.05
Non-aerosol	8.88	10.29	4.18	5.58	0.00	0.00
Toilet/Urinal Care						
Aerosol*	n/a	n/a	n/a	n/a	0.00	0.00
Liquid	1.36	2.56	0.60	1.10	0.00	0.00
Solid	0.17	0.18	0.15	0.24	0.00	0.06
Wood Cleaner						
Aerosol	0.12	0.17	0.11	0.17	0.00	0.00
Non-aerosol	0.59	0.59	0.18	0.18	0.00	0.00
Personal Care						
Hair Styling Product						
Aerosol/Pump Spray	0.69	0.81	0.44	0.71	0.00	0.00
All Other Forms	0.22	0.41	0.13	0.26	0.00	0.00
Shaving Gel (aerosol)- Tier 1	0.33	0.65	0.33	0.65	0.00	0.00
Shaving Gel (aerosol) - Tier 2	0.33	0.65	0.34	0.68	0.01	0.03
					Min Increase	0.00
					Max Increase	1.34

* 100% of products comply with proposed limit, 0 cost to reformulate

Table VIII-9. Estimated Per-Unit Cost Increases from Both Annualized Non-Recurring and Annual Recurring Costs

Category	Sales-Wtd Average VOC Content, % (A)	Estimated VOC Emissions, tons/day (B)	Typical Unit Weight Ounces (C)	Complying Market Share	Estimated Non-complying Unit Sales Per Day in Calif. (D)	Estimated Per Unit Production Cost Increase: Annualized Nonrecurring Low Cost/Unit (E1)	Annualized Nonrecurring High Cost/Unit (E2)	Annual Recurring Low Cost/Unit (F1)	Annual Recurring High Cost/Unit (F2)	Total Increase Low/Unit G1=(E1+F1)	Total Increase High/Unit G2=(E2 + F2)	Total Increase Mid/Unit (G1+G2)/2
Adhesives												
Contact Adhesive												
General Purpose	57	0.07	4.32	80	182	$0.02	$0.02	0.03	0.05	$0.05	$0.07	$0.06
Special Purpose (labeling only)*****	65	0.075	13.84	100.00	267	$0.00	$0.01	0	0	$0.00	$0.01	$0.01
Household Care												
Adhesive Remover												
Gasket or Thread Locking Adh. Rem.	31.046	0.031	18.00	0.00	178	$0.07	$0.30	0.77	0.77	$0.84	$1.07	$0.95
Floor & Wall Covering Adh. Remover	21.724	0.666	100.00	42.00	569	$0.03	$0.12	0.00	1.34	$0.03	$1.46	$0.74
General Purpose Adhesive Remover	80.289	0.304	9.00	11.00	1,198	$0.03	$0.11	0.19	0.00	$0.22	$0.11	$0.17
Specialty Adhesive Remover	94.344	0.46	18.00	6.00	815	$0.02	$0.07	0.35	0.00	$0.37	$0.07	$0.22
Air Freshener***	99	0.6	16.00	0.00	1,212	$0.02	$0.08	0.00	0.00	$0.02	$0.08	$0.05
Antistatic Product												
Aerosol	97.7	0.275	7.00	2.00	1,261	$0.00	$0.01	0.00	0.01	$0.00	$0.02	$0.01
Non-aerosol*	n/a	n/a	n/a		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Electrical Cleaner	51.2	0.33	12.00	10.00	1,547	$0.03	$0.04	0.00	0.00	$0.03	$0.04	$0.04
Electronic Cleaner	52.2	0.241	12.00	52.00	591	$0.08	$0.30	0.00	0.00	$0.08	$0.30	$0.19
Fabric Refresher												
Aerosol	28.444	0.424	14.00	1.00	3,373	$0.00	$0.01	0.17	0.15	$0.17	$0.16	$0.17
Pump Spray, liquid, solid	4.34	0.665	32.00	97.00	460	$0.03	$0.05	0.00	0.00	$0.03	$0.05	$0.04
Footware or Leather Care Product												
Aerosol	29.3	0.05	4.25	82	231	$0.02	$0.06	0.01	0.01	$0.03	$0.07	$0.05
Solid	42.8	0.174	1.13	39	7,023	$0.00	$0.00	0.00	0.00	$0.00	$0.00	$0.00
All Other Forms	6.59	0.094	3.29	87	1,804	$0.02	$0.06	0.00	0.00	$0.02	$0.06	$0.04
Graffiti Remover												
Aerosol	56.589	0.085	17.00	0.00	283	$0.10	$0.41	0.05	0.05	$0.15	$0.46	$0.31
Non-aerosol	70.768	0.11	128.75	11	34	$0.64	$2.03	0.00	0.00	$0.64	$2.03	$1.33
Toilet/Urinal Care												
Aerosol*	n/a	n/a	n/a		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Non-Aerosol**	30.4	2.627	4.00	29.80	48,530	$0.00	$0.01	0.00	0.06	$0.00	$0.07	$0.03
Wood Cleaner												
Aerosol	24.827	0.053	12.00	0.00	569	$0.01	$0.02	0.00	0.00	$0.01	$0.02	$0.01
Non-aerosol	8.995	0.226	135.98	90	59	$0.11	$0.28	0.00	0.00	$0.11	$0.28	$0.20
Personal Care												
Hair Styling Product												
Aerosol/Pump Spray	12.947	0.190	14.50	72.00	907	$0.03	$0.07	0.00	0.00	$0.03	$0.07	$0.05
All Other Forms*****	0.839	0.468	12.00	81.40	27,667	$0.00	$0.00	0.00	0.00	$0.00	$0.00	$0.00
Shaving Gel-Tier 1	7.669	1.03	7.00	34.00	40,417	$0.00	$0.00	0.00	0.00	$0.00	$0.00	$0.00
Shaving Gel-Tier 2	7.689	1.03	7.00	0.00	61,238	$0.00	$0.00	0.01	0.03	$0.01	$0.03	$0.02
										Min Unit Cost Increase		$0.00
										Max Unit Cost Increase		$2.03

* Categories where 100% of Products that reported in Survey meet proposed limit, no reformulation needed.

** Used sales weighted average and typical weight for solid form.

*** The data used for Air Fresheners was the latest available data, which was from the 1997 Consumer Products Survey.

**** For Hair styling product - All other forms due to the large number of 0 VOC products skewing the SWA VOC % the actual product sales of 22.7 tons per day was used divided by the average product size.

***** Special Purpose Adhesives require no reformulation due to 100% of product meeting the proposed limit, but will incur costs due to relabeling.

Notes:

(1) (E) = Total Annuelized Non-recurring Cost / [(D) * 365]

(2) Figures in "( )" are negative (i.e., indicates potentiel cost savings)

Cost Per Unit

	Total Est. Noncomp Unit Sales per day in Ca.	Total Cost Table VIII-2	Cost/unit
Tier I	139,176	$8,173,426	$0.16
Tier II	200,414	$10,171,439	$0.14

IX.

ENVIRONMENTAL IMPACTS

A. SUMMARY OF ENVIRONMENTAL IMPACTS

In this rulemaking, staff is proposing to amend the Consumer Products Regulation (Regulation) by establishing volatile organic compound (VOC) limits for 15 categories of consumer products. The intent of these proposed amendments is to protect the public's health by reducing their exposure to ground level ozone. Other amendments, designed to clarify various aspects of the Regulation, are also proposed. Minor amendments to the Antiperspirants and Deodorants Regulation, and the Aerosol Coating Products Regulation are also proposed. Amendments to Air Resources Board (ARB) Method 310, which is used to determine compliance with VOC limits, are also proposed.

Staff is also proposing measures to reduce the amounts of Toxic Air Contaminants (TACs) used in seven categories, including the previously regulated category of General Purpose Degreasers.

Finally, within this rulemaking staff is proposing an Airborne Toxic Control Measure (ATCM) which would prohibit the use of the TAC Para-dichlorobenzene (PDCB) in solid air fresheners and toilet/urinal care products.

As part of this rulemaking ARB staff has investigated the potential environmental impacts of the proposed amendments to the Consumer Products Regulation, the Antiperspirant and Deodorant Regulation, the Aerosol Coatings Regulation, ARB Method 310, and the proposed ATCM. Overall, staff has determined that the proposed amendments would have a positive environmental impact by reducing the amount of ground level ozone formed from consumer product VOC emissions. A VOC emission reduction of about 6.0 tons per day (tpd) is expected beginning December 31, 2006. By December 31, 2009, emission reduction benefits grow to 6.8 tpd. In 2010, the reduction equates to about 6.9 tpd statewide, and a 2.9 tpd reduction in the South Coast Air Quality Management District (SCAQMD). These ozone precursor reductions include the ancillary VOC reductions achieved by eliminating the use of PDCB, a VOC, in air fresheners and toilet and urinal care products. Reductions in particulate matter (secondary organic aerosols) are also expected.

Another environmental benefit of the proposal is elimination of emissions of the TACs Para-dichlorobenzene (PDCB), perchloroethylene (Perc), methylene chloride (MeCl), and trichloroethylene (TCE) in the categories containing these compounds. In total, based on the 2001 Survey data, we expect to eliminate over one million pounds (510 tons) per year of Perc, MeCl, and TCE emissions. In 2006 this reduction would become 559 tons per year. As a consequence of proposing an ATCM prohibiting the use of PDCB in solid toilet/urinal care products, and solid air fresheners, an emission reduction of about 2.4 million pounds (1,219 tons) per year of this TAC, would be

achieved in 2006. In total, toxic emission would be reduced by 1,778 tons per year in 2006. As explained in further detail below, many alternative effective products already exist in each of these categories.

However, due to the staff's proposal to prohibit the use of Perc, MeCl, and TCE, there could be a slight increase in VOC emissions in Gasket or Thread Locking Adhesive Removers, because it is expected that manufacturers will replace their chlorinated solvent content with VOC ingredients. In the case of the proposed ATCM for PDCB, no VOC emission increases are expected.

ARB staff has also determined that no significant adverse environmental impacts should occur as a result of the proposed amendments relating to establishing VOC limits. Staff does estimate that there may be a slight increase, though not significant, in emissions of global warming compounds. We will also monitor this potential impact through future surveys.

Staff has also determined that the proposals designed to clarify other aspects of the Regulation, including changes to the "Most Restrictive Limit" provision, "Code Dating," Notification of Sell-Through, and changes to the "Reporting Requirements," will not result in any adverse environmental impacts. In fact, a positive environmental impact may result because the proposed revisions are designed to ensure that emission reductions committed to in this rulemaking, as well as previous rulemakings, are fully realized.

Minor changes are proposed to ARB Method 310, and the test methods sections in the Consumer Products, Antiperspirants and Deodorants, and Aerosol Coating Products Regulation. These changes would have no adverse environmental impact because only technical changes are proposed that will not affect the environment. A further amendment of the Antiperspirant and Deodorant Regulation would modify the definition of "Deodorant." No adverse impacts are expected due to modifying the definition. Chapter V of this report contains a complete description of these proposals.

Staff has conducted a qualitative health risk assessment that concludes that because VOCs are ozone precursors, public health is further protected by reducing VOC emissions. Staff has also determined that hundreds of potential excess cancer cases would be avoided by prohibiting the use of chlorinated solvent TACs. A detailed health impacts analysis regarding the benefits of prohibiting the use of the potential human carcinogen PDCB is included in Chapter VII of this report.

B. LEGAL REQUIREMENTS APPLICABLE TO THE ANALYSIS

The California Environmental Quality Act (CEQA) and ARB policy require an analysis to determine the potential adverse environmental impacts of proposed regulations. Because the ARB's program involving the adoption of regulations has been certified by the Secretary of Resources (see Public Resources Code section 21080.5), the CEQA environmental analysis requirements are allowed to be included in the ARB

Initial Statement of Reasons in lieu of preparing an environmental impact report or negative declaration. In addition, the ARB will respond in writing to all significant environmental points raised by the public during the public review period or at the Board hearing. These responses will be contained in the Final Statement of Reasons for the proposed amendments to the Regulation.

Public Resources Code section 21159 requires that the environmental impact analysis conducted by ARB include the following: (1) an analysis of the reasonably foreseeable environmental impacts of the methods of compliance; (2) an analysis of reasonably foreseeable feasible mitigation measures; and, (3) an analysis of reasonably foreseeable alternative means of compliance with the Regulation.

Our analysis of the reasonably foreseeable environmental impacts of the methods of compliance is presented in subsections C through J below. Regarding reasonably foreseeable mitigation measures, CEQA requires an agency to identify and adopt feasible mitigation measures that would minimize any significant adverse environmental impacts described in the environmental analysis.

C. ALTERNATIVE MEANS OF COMPLIANCE

Two alternative means of compliance with the Regulation have been developed. A current compliance alternative for manufacturers of consumer products is the Alternative Control Plan (ACP). The ACP Regulation, title 17, California Code of Regulations, sections 94540-94555, is a voluntary emissions averaging program. Under the ACP, an overall limit on the VOC content of emissions from each individual product in the ACP is determined. To be approved, an ACP must demonstrate that the total VOC emissions within the ACP would not exceed the emissions that would have resulted had the products been formulated to meet the VOC limit established for each product category. In other words, some products in the ACP could exceed the established VOC limits in the Regulation as long as those increased emissions were offset by additional products that over-comply with the established VOC limits. The ACP provides manufacturers with flexibility, but preserves the overall environmental benefits of emission reductions.

Another compliance alternative that is available for manufacturers is the Innovative Products Provision specified in title 17, California Code of Regulations, section 94511. This provision allows a manufacturer to formulate products that exceed the mass-based limit specified in the Regulation for a particular product category. The manufacturer must demonstrate that, through some characteristic of the higher VOC product, its use will result in less VOC emissions compared to a representative complying product. This alternative is also specifically designed to allow manufacturers flexibility, while preserving the emission benefits of the Regulation.

Absent use of either of these alternatives, the staff is not aware of any additional compliance means, other than direct compliance with the proposed VOC limits and proposed prohibition of the use of Perc, MeCl, and TCE in specified categories. Staff is

not aware of alternative means of compliance with the proposed ATCM for PDCB. However, we note that many alternative complying products already exist.

D. AIR QUALITY ENVIRONMENTAL IMPACTS

1. Ground level Ozone

The primary intent of the proposed amendments to the Regulation is to reduce the formation of tropospheric, or ground-level ozone by reducing VOC emissions from 15 categories of consumer products. Enhanced ground level ozone formation involves the interaction between VOCs and oxides of nitrogen (NO_x) in the presence of sunlight. For a more complete description concerning ground level ozone and health impacts related to elevated ozone concentrations, the reader is referred to Chapter IV of this report.

Reducing ozone precursor emissions, namely VOCs, would result in a positive environmental impact by lowering the concentrations of ground level ozone in the atmosphere. The proposed amendments are designed to reduce VOC emissions by 6.0 tpd, effective December 31, 2006, with reductions increasing to about 6.8 tpd by December 31, 2009. The categories proposed for regulation and the corresponding VOC emission reductions are shown in Table IX-1 below.

Table IX-1
Proposed VOC Limits and Reductions by Product Category

Product Category	Product Form	Proposed VOC Limit (wt%)	VOC Emission Reductions (TPD)[1]
Adhesive Removers:			
Gasket or Thread Locking Adhesive Remover	All	50	*-0.011*[2]
Floor or Wall Covering Adhesive Remover	All	5	0.630
General Purpose Adhesive Remover	All	20	0.258
Specialty Adhesive Remover	All	70	0.138
Air Freshener[3]	--	--	0.624
Anti-Static Product	Aerosol	80	0.057 (12/31/08)
	Non-aerosol	11	0.000
Contact Adhesive:			
Contact Adhesive - General Purpose	All	55	0.003
Contact Adhesive - Special Purpose	All	80	0.000[4]
Electrical Cleaner	All	45	0.070
Electronic Cleaner	All	75	0.049
Fabric Refresher	Aerosol	15	0.221
	Non-aerosol	6	0.220
Footwear or Leather Care Product	Aerosol	75	0.008
	Solid	55	0.039
	All Other Forms	15	0.060
Graffiti Remover	Aerosol	50	0.014
	Non-aerosol	30	0.071
Hair Styling Product	Aerosol, Pump Spray	6	0.404
	All Other Forms	2	0.163
Shaving Gel	All	7	0.124
		4	0.435 (12/31/09)
Toilet/Urinal Care Product	Aerosol	10	PD[5]
	Non-aerosol	3	2.709
Wood Cleaner	Aerosol	17	0.019
	Non-aerosol	4	0.232
		Total Reductions by 2006	6.05
		Total Reductions by 2008	6.28
		Total Reductions by 2009	6.81

1 Survey emissions adjusted for market coverage as discussed in Volume II, Chapter IV; reduction on the effective date of limits which is December 31, 2006, except where otherwise noted.
2 VOC emission increase as result of prohibition on use of certain specified TACs.
3 Currently a regulated category; with elimination of the exemption for 98% para-dichlorobenzene products, additional reductions will be achieved from replacement with lower VOC air fresheners.
4 No reductions; Contact Adhesive was separated into two subcategories and the existing 80% VOC limit was retained for this subcategory.
5 PD = Protected Data; reductions omitted to protect manufacturers' confidential information.

Total emissions from these categories in 2001 were about 8.7 tpd, and would grow to 9.5 tpd in 2006, without controls. Therefore, the staff's proposal represents about a 65 percent reduction in emissions when all limits become effective in 2009.

Staff has also evaluated the potential for VOC emission increases resulting from other proposals within this rulemaking, namely the ATCM for PDCB and the elimination of Perc, MeCl, and TCE. The phaseout of a stratospheric ozone depleting compound is also assessed. Staff has found that some of these proposals may lead to a slight increase in VOC emissions, although any increases would likely be negligible. Because these proposals relate to elimination of TACs, staff believes that the small potential increase in VOC emissions is outweighed by the reduction in these potentially carcinogenic TACs. Our analyses follow.

a. Proposed Prohibition on Use of Perc, MeCl, and TCE

Staff is proposing to prohibit the use of Perc, MeCl, and TCE, in seven categories. Six are previously unregulated categories and include Adhesive Removers, Contact Adhesives, Electrical Cleaners, Electronic Cleaners, Footwear or Leather Care Product, and Graffiti Removers. Accounting for growth to 2006, these six categories, for which VOC limits are being proposed, would emit approximately 1.52 tpd of these three chlorinated solvents in California. Emissions of Perc and MeCl, in 2006, would comprise 1.28 tpd of the total of 1.52 tpd. Some products meet the proposed VOC limits because of the use of Perc and MeCl, which are VOC-exempt solvents. However, as these products are reformulated to remove these TACs, likely replacements would be VOC ingredients. This means that the VOC content of these products would increase, but only up to the proposed limit. Any VOC emission increase in these products would erode the overall VOC emission reduction from the category. We have evaluated this impact on overall VOC emission reductions from the categories after applying the proposed limits.

If Perc and MeCl would continue to be allowed for use, VOC emission reductions from all six categories would be 1.37 tpd in 2006. The effect of prohibiting the use of MeCl and Perc changes the overall VOC reduction from these six categories to 1.34 tpd, a difference of 0.03 tpd. Staff concludes this change is minimal and that reducing Perc and MeCl emissions by 1.28 tpd in these six categories offsets the small change in VOC reductions.

As for General Purpose Degreasers, a previously regulated category, a VOC limit of 4 percent by weight will become effective on December 31, 2004. Staff has found that VOC reductions would change by less than 0.06 pound per day, or less than 22 pounds per year, a negligible change.

Note that TCE is a VOC so as products are reformulated to remove it, no change in expected VOC reductions will occur, even if all TCE is replaced with other VOC ingredients.

In determining that we would achieve an additional reduction of 0.03 tpd if Perc, MeCl, and TCE were not prohibited, we have assumed a worse case scenario where all of the currently used chlorinated solvent is replaced with VOCs. Staff notes however, that there are several viable reformulation options, including use of exempt VOCs such as acetone, such that there could be little to no change in overall VOC reductions. We believe the small amount of VOC reduction lost due to prohibiting the use of these TACs outweighs the adverse impact from continued TAC use.

b. Effect of Phase-out of Hydrochlorofluorocarbon (HCFC)-141b

Another issue that may further erode the benefit of the proposed VOC limits would be the phaseout of the use of hydrochlorofluorocarbon (HCFC)-141b, under the Montreal Protocol. This compound is used extensively in Electronic and Electrical Cleaners. Production of this stratospheric ozone depleting compound has already ceased, with only the use of existing stocks allowed. However, once this option for cleaning of electronic and electrical equipment is no longer available, VOC alternatives may be used. If all HCFC-141b were to be replaced by VOCs, the VOC emission reduction benefit would be reduced by 0.22 tpd. This potential increase is not reflected in the emission reductions expected for Electrical and Electronic Cleaners because existing stores of HCFC-141b could last for a number of years. If, over the next several years, suitable non-VOC replacements are found, the impact may be lessened.

c. Proposed ATCM for PDCB

Staff has evaluated whether, as a result of prohibiting the use of PDCB in toilet/urinal blocks and air fresheners, there would be an increase in ground level ozone concentrations or VOC emissions due to use of alternative products. Staff has determined that there would be no potential adverse impact and, to the contrary finds that there would be some air quality improvement, from prohibiting the use of PDCB. Not only would emissions of a potential carcinogen be eliminated, but there would be a small reduction in ground level ozone concentrations. Our analysis follows.

1. Increased Ozone Formation

Based on the published maximum incremental value (MIR), (see title 17, CCR, section 94700), staff agrees that PDCB is a fairly low reactive VOC compound, meaning it has a low potential to react to form ozone. However, we note that it has not qualified for exemption from the VOC definition at either the Federal or State level. Thus, PDCB is a VOC. Para-dichlorobenzene in the atmosphere will photochemically react to lead to formation of ozone. While we agree that fragrances other than PDCB are usually more reactive, we disagree that we will see an increase in ozone concentrations due to the proposed ATCM.

First of all, before we step through our analysis, it should be noted that photochemical reactivity information, namely MIR values, for most fragrance components is not available. Thus, our analysis, due to lack of data, can only focus on

fragrance components where reactivity information is available. This fact does not diminish our analysis because important, typical fragrance components, those that provide pine and citrus scents, have been studied for their impact on ozone production (Carter, 2000). These terpene compounds provide the basis for our comparison of ozone forming ability of alternative products with that of PDCB products.

Secondly, it should be noted, that even though reactivity data are available for a number of compounds (over 700 VOCs), such that MIR values can be estimated, some MIR values are "uncertain" because their atmospheric reaction chemistry is not well understood. Such is the case for PDCB. According to Dr. William Carter, developer of the MIR scale used by ARB in regulatory applications, no photochemical data are available for this compound. The MIR value of 0.2 g O^3/g VOC is based only on a parameterized estimate (ARB, 2003c; Carter, 2004).

Because of the uncertainty of the MIR value for PDCB, Dr. Carter recommends that the published MIR value be adjusted for regulatory applications (see Appendix F, within ARB, 2000c). The ARB staff, in recognition of Dr. Carter's recommendations, developed a protocol to adjust MIR values based on uncertainty. In the case of PDCB, ARB staff, in regulatory applications, would adjust the published MIR value upward to help ensure an air quality benefit, if the compound were to be used. As documented in the Aerosol Coatings Regulation amendments in 2000, VOCs in Dr. Carter's uncertainty bins 5 and 6, which would include PDCB, would be doubled (see Chapter IV, part 5). Thus, from a regulatory standpoint staff would consider the reactivity of PDCB to be 0.4 g O^3/g VOC (ARB, 2000c). In this scenario, obviously the calculated ozone formation potential of PDCB would be greater.

Moreover, in instances where the chemistry of a compound is highly uncertain, calculating the "upper limit" MIR value may be more appropriate. The "upper limit" MIR is a mathematical calculation to determine the absolute maximum potential of a compound to form ozone. The procedure for the calculation is described in Appendix E of the Amendments to the Aerosol Coatings Regulation, May 5, 2000 (ARB, 2000c). Following this procedure the calculated "upper limit" MIR value for PDCB, would be 1.11 g O^3/g VOC. Based on the foregoing, to put it simply, PDCB could react to form over five times more ozone than would be assumed using the published MIR value.

While it is uncertain whether there would indeed be more ground level ozone formed from emissions of PDCB, than the published MIR value would indicate, it is important to note that one should not rely on the published MIR value, in the case of PDCB, to accurately predict the ozone formation potential of this compound. On the other hand, we can more reliably predict the ozone forming ability of the common terpene fragrances because the atmospheric reactions of pine oil and limonene have been better characterized. We note that Dr. Carter does not recommend adjustment of the MIR value for these compounds to address uncertainty (Carter, 2000).

Aside from whether the MIR value for PDCB accurately reflects its ozone forming potential, let us assume, a PDCB toilet block is replaced by a non-PDCB product

containing pine oil. We believe this same analysis would be applicable to solid air fresheners, as well. A typical PDCB toilet block may be 100 percent PDCB, or may contain 1-2 percent additional fragrance, with the balance being PDCB. Using the published MIR value for PDCB of 0.20 g O^3/g VOC, and considering the product as 100 percent PDCB, the product-weighted MIR (PWMIR) would also be 0.20 g O^3/g product. If we consider the 1-2 percent fragrance and assume it is a highly reactive compound, the PWMIR for the PDCB product would be even higher.

However, for the purposes of our analysis we used the conservative assumptions that, 1) the MIR value for PDCB is the published value of 0.2 g O^3/g VOC; 2) the toilet block is composed of 100 percent PDCB (no additional fragrance component); and 3) the VOC in alternative products is all fragrance (the most reactive component). Using the MIR value for alpha pinene (the primary component in pine oil) of 4.29 g O^3/g VOC for the ingredient, and the published MIR value of PDCB, we find that pine oil, is 21 times more reactive than PDCB.

"Alternative products" include both solid and liquid units that are either hung on toilet bowl rims, placed at the drain of urinals, or hung on a wall. The Consumer Products Regulation, for determining compliance with VOC standards based on weight, does not count the weight of the fragrance, up to 2 percent, for determining compliance. However, for reactivity comparisons, let us assume we do not apply the exemption. While the vast majority of the "alternative replacement" products already comply with the proposed 3 percent VOC limit for non-aerosol toilet/urinal care products, several products will need to be reformulated. This means those few products needing to reformulate to comply with a 3 percent VOC limit would contain at the most 5 percent VOC (including fragrance).

Adjusting the 2001 survey data to bring all alternative products into compliance by adjusting their total VOC content to 5 percent, yields an overall sales-weighted average VOC content for alternative products of 2.81 percent by weight, including fragrance. Assuming the typical "alternative product" would contain all of the 2.81 percent VOC as pine oil, the PWMIR for the "alternative product" would be 0.12 g O^3/g product or approximately one-half of the PWMIR for the PDCB product.

Therefore, staff concludes that prohibiting PDCB in toilet and urinal care products and air fresheners would result not only in a VOC reduction benefit but also an ozone benefit. While the difference between a 0.20 PWMIR and a 0.12 PWMIR seems small, when you consider the large amount of PDCB emissions--over 3.3 tons per day (1,219 tons)--the amount of ozone production could be reduced by over 97 tons per year in 2006 by prohibiting its use.

If we did not make the assumption that all of the VOC content of alternatives was fragrance, there would be an even greater ozone reduction benefit. The 2001 survey data show that other non-fragrance VOCs in alternative products is about 1 percent by weight. Assuming the 1 percent is ethanol, a common VOC, and assuming the balance

of the product is pine oil, the PWMIR of alternatives would be 0.1 g O^3/g product. In this case, ozone production would be reduced by over 120 tons per year.

2. Increased VOC Emissions

Some comments were received claiming that "alternative products" for PDCB products would result in increased VOC emissions. Other comments claim that alternative toilet blocks or room air fresheners do not last as long and that more frequent refill requirements will lead to increased emissions from the alternative products, negating the gain of their lower VOC content.

In addressing these comments, it is important to keep in mind that PDCB is a potential human carcinogen. The alternatives are not. Any implications of increased VOC emissions from alternative products, either because they do not last as long, or that they have higher VOC emissions, would have to be balanced by the overall health benefit of reducing the public's exposure to the TAC PDCB. However, staff has found neither of these claims regarding VOC emission increases to be true.

To address these comments, increased VOC emissions from using alternative products could result from: 1) users switching from solid products to other product forms that contain more VOCs, such as aerosols, or 2) switching to products that do not last as long. These two possibilities are linked in that the alternative switched to, even if higher in VOC content, would have to not last as long for the comments to be true. The following paragraphs explain why there would not be an emissions increase.

For a variety of reasons, most notably similar cost and convenience, the most likely scenario is that most users of PDCB products would switch to alternative products of the same product form, namely solids. Solid alternative products are readily available, and the marketshare held by these alternatives suggest they are effective, such that current users of PDCB products would not likely increase their cost by buying more expensive products. Solid air fresheners for both toilet/urinal use and air freshening have been meeting a VOC limit of 3 percent by weight since 1993. A pound of PDCB product (100 percent VOC) produces a pound of VOC. On the other hand a, pound of alternative solid air freshener yields 0.03 pound of VOC. Thus, for there to be an increase in VOC emissions, alternative solid products would have to be replaced more than once daily over the course of a month (0.03 pound X 30 days = 0.9 pound VOC) to produce a pound of VOC and effect an increase in VOC emissions.

Although not likely due to increased product and maintenance costs, even if some PDCB solid air fresheners are replaced by aerosol air fresheners, we still conclude that VOC emissions would be reduced as a result of the prohibition. An aerosol replacement would likely be a metered-dose single phase product. This type of product is considerably more expensive than a solid air freshening product and requires equipment to dispense the product. We found the cost of dispensing systems to be between $50 and $70, and a 12 ounce can of air freshener, claiming to be a month's supply, to cost between $5-$7. Assuming that the cost of PDCB air fresheners is similar

to PDCB toilet blocks, and that 12 ounces of PDCB product provides the same deodorizing capability of the 12 ounce aerosol product, the cost of the PDCB product would be about $2. Thus to switch from a solid product to an aerosol product would about triple the cost for product alone (not counting dispensing equipment). Consumers are not likely to triple their costs when alternative solid products are readily available at similar cost.

However, for completeness, the VOC limit for single phase aerosols is the highest among air fresheners (excluding disinfecting products) at 30 percent by weight. Thus, users would have to replace the aerosol product over three times a month to result in equivalent VOC emissions as those from the PDCB product (a 12 ounce can of single phase aerosol would yield about 0.23 pound of VOC compared to PDCB in which 12 ounces emits 0.75 pound of VOC). As discussed below, alternative products are marketed to last the same amount of time as PDCB products.

We have not found the claim that alternative air fresheners or toilet/urinal blocks do not last as long as PDCB products to be true, based upon our market research. Our review of hundreds of retailers marketing either room air fresheners or toilet/urinal blocks, found that a 30 day product life advertisement was universal. The typical 4 ounce PDCB toilet/urinal block is advertised to last about 30 days. The same retailers also typically market the competing, non-PDCB products, which are also said to last about 30 days. This was not seen with just a few marketers of these products, but with every retailer. We feel it is very unlikely that retailers would consistently market these products in this way if the claims were not founded, especially because it is the same retailers selling both PDCB and alternative products.

In addition to the toilet/urinal blocks, many air freshener products are advertised to last approximately one month. Refill canisters for metered dose air fresheners, and the non-PDCB solid and gel air fresheners intended for general room use typically advertise a 30 day product life. While specific use conditions, such as a hot, dry environment, may cause a product to evaporate more quickly, these products are intended for indoor use, where climatic conditions tend to be very stable. We have no reason to believe that manufacturer claims for alternative products are inaccurate. In summary, we disagree that the competing products are not likely to last as long as their PDCB counterparts.

Based on the foregoing staff finds the claims that VOC emissions will increase, either because alternatives contain more VOCs, or do not last as long, as PDCB products, to be groundless. Moreover, staff notes that when the limit of 3 percent was first adopted for solid air fresheners, direct replacements for PDCB toilet/urinal care products did not exist, thus, exemption was appropriate. However, today, with many replacements available, continuing the exemption for PDCB products, which are 100 percent by weight VOC, compared to alternatives at 3 percent VOC, is now an unnecessary source of excess VOC emissions amounting to over 3.3 tpd.

2. Impact on Particulate Matter (Secondary Organic Aerosols)

Overall, our analysis found that the proposed rulemaking would not likely have a significant environmental impact on formation of particulate matter (PM), i.e. secondary organic aerosols (SOA). However, as detailed below, in the absence of SOA formation data for certain ingredients, and the uncertainty associated with the reformulation approaches manufacturers will pursue, it is difficult to determine definitively the full impacts that the implementation of the proposed amendments would have on ambient PM concentrations. Hence, we will continue to monitor implementation of the Regulation and reassess the impacts as more data become available. For completeness, staff has analyzed potential reformulation options and how SOA may be impacted.

Fine PM is prevalent in the urban atmosphere (see, for example, Pandis *et al.,* 1992), and ambient PM, especially those with aerodynamic diameters less than two and a half micrometers ($PM_{2.5}$) is known to have negative impacts on human health (Schwartz *et al.*,1996; Moolgavkar and Luebeck, 1996). Like ozone, PM can be formed via atmospheric oxidation of organic compounds (Finlayson-Pitts and Pitts, 2000). Significant advances have been made in the theoretical and the experimental studies of the formation of secondary organic aerosols (SOA) (Pankow, 1994a, 1994b; Odum *et al.*, 1996; Seinfeld and Pandis,1998; Harner and Bildeman, 1998; Kleindienst, *et al.*, 1999; Yu *et al.*, 1999). In addition, modeling techniques to determine the amount of ozone as well as the amount of aerosol formed from a VOC have been established (Bowman *et al.*, 1994), and the concept similar to maximum incremental reactivity is being applied to quantitatively assess the aerosol formation potential of a VOC (i.e. incremental aerosol reactivity) (Griffin *et al.*, 1999). Further information on SOA is found in Chapter IV.

Based on the results of these studies, we now know that there is a mechanistic linkage between the ozone formation and SOA formation of a VOC. Because of this relationship, the proposed amendments may also affect the SOA formation potential of consumer products. The analysis of the impact on SOA formation resulting from implementing the proposed VOC limits is detailed below.

Although most organic compounds contribute to ozone formation, SOA is usually formed from photooxidation of organic compounds with carbon numbers equal to seven or more (Grosjean and Seinfeld, 1989; Wang *et al.*, 1992). It has also been shown that aromatic compounds are more likely to participate in the formation of SOA than are alkanes (Grosjean, 1992; Pandis *et al.,* 1992). In other words, only chemicals which react fast enough in the atmosphere will generate sufficient amounts of low volatility products for forming aerosols. In general terms, the potential to form SOA among commonly used classes of VOCs used in consumer products could be described by the following order, with the lower molecular weight alkanes and ketones being least likely:

Least Likely	Lower molecular weight alkanes & ketones (7 carbons or less)
	Higher molecular weight alkanes
	Higher molecular weight aromatics (polysubstituted benzenes)
More Likely	Lower molecular weight aromatics (C7 & C8 compounds)

The analysis of the potential impact on PM formation assumes that to meet the proposed limits, in 2006 terms, will require substituting 5.7 tpd of non-VOC ingredients or exempt VOC for 5.7 tpd VOCs. To meet the proposed limits, manufacturers generally have five reformulation options: use of exempt VOCs, such as acetone or methyl acetate; use of LVP-VOC solvents; use of water; increasing 'solids' content; or use of non-VOC propellants. While reducing overall VOC content to comply, some manufacturers may opt to use smaller amounts of 'stronger' VOCs to maintain the product's attributes. It is difficult to predict which reformulation path or combination of paths will be taken by manufacturers. However, substitution for VOCs with water, higher solids content, or non-VOC propellants would likely result in a small reduction in SOA formation. The most likely exempt VOC solvents to be used to comply, acetone and methyl acetate, both having three carbon atoms, have little potential to contribute to SOA formation. Indeed, it has been predicted that there would be no SOA yield from acetone (Pandis *et al.,* 1992). Hence, use of these compounds could also result in a reduction in SOA.

To the extent manufacturers may reduce overall VOC content but formulate with stronger solvents could result in increased SOA formation. This is because the commonly used stronger solvents are aromatic compounds, such as xylenes and toluene, that are known to have higher SOA potentials than other commonly used VOCs. On the other hand, if product reformulation involves the substitution of an aromatic by a non-aromatic species, the SOA formation potential of the product is likely to be reduced. If VOC aromatics are replaced with LVP-VOC aromatic compounds, a decrease in SOA potential should also occur. However, substitution of LVP-VOC alkane or aromatic compounds for smaller low molecular weight alkanes could result in a slight SOA increase (Grosjean, 1992).

Because we can not fully predict how manufacturers would choose to reformulate, we can not fully evaluate the potential for increased SOA formation. However, it is likely to be only a slight potential for increase, if any, due to the variety of reformulation options available. Additionally, any reformulations that result in increased SOA would likely be offset by reformulations resulting in lower SOA. We will continue to monitor implementation of the Regulation and reassess the impacts as more data become available.

Other proposals within this rulemaking to prohibit TACs should have no or negligible impacts on SOA formation because replacements for these TACs (alkanes or exempt compounds) are not known to have strong SOA formation potentials.

3. Impact On Global Warming

Global warming is the process whereby emissions of anthropogenic pollutants, together with other naturally-occurring gases, absorb infrared radiation in the atmosphere, leading to increases in the overall average global temperature. Compounds of concern in global warming include carbon dioxide (CO_2), methane, water vapor, nitrous oxide, fluorocarbons, VOCs, and ozone. In this rulemaking, the compounds of concern are VOCs, ozone, CO_2, and hydrofluorocarbons, such as hydrofluorocarbon (HFC)-152a and HFC-134a. Each is discussed below.

The Global Warming Potential (GWP) of a substance is a measure of the extra amount of heat that is trapped in the atmosphere when one kilogram of the substance is released instantaneously into it, relative to the case when one kilogram carbon dioxide is released. GWPs are calculated using computer models which incorporate the radiative heat balance of the atmosphere and the chemical kinetics of all the substances involved. The model is initially in a steady state. If a kilogram of a greenhouse gas is released, the temperature will increase until a new steady state is established. If a substance stayed in the atmosphere indefinitely, the new steady state would be permanent and the increase in temperature could be used as a measure of the GWP. However, organic compounds are removed from the atmosphere by various processes including photochemical reactions and wet and dry deposition. In time, the concentration of the emitted substance will decline to zero and the initial state will be restored. Consequently, a simple temperature increase cannot be used as a measure of GWP because it depends on the atmospheric persistence of the compound.

The GWP of a compound includes a direct effect and an indirect effect. As mentioned earlier, the direct effect is the warming due to the absorption of radiation by molecules of the compound in question. The indirect effect is due to the impact that the presence of the compound has on the concentration of other greenhouse gases. VOCs could contribute indirectly to global warming, insofar as they react chemically in the atmosphere in ways that increase greenhouse gas concentrations, most notably, concentrations of ozone. The indirect forcing through changes in the hydroxyl radical (OH) and ground level ozone is small for each VOC taken individually, but can be significant for the entire family (Johnson and Derwent, 1996; Wigley *et al*., 2002). The indirect forcing of VOCs is still poorly quantified and requires the use of global three-dimensional chemical transport models. Accurate calculations of these effects are a notoriously difficult problem in atmospheric chemistry.

a. VOCs and Ozone

Almost all VOCs have the potential to contribute directly to global warming by absorbing infrared radiation from the earth's surface. In general the more complex a VOC, the greater its ability to absorb infrared radiation, however most VOCs have a very short atmospheric lifetime and are broken down by atmospheric reactions. Generally speaking the exceptions to this rule are the saturated light hydrocarbons and halogenated compounds. VOCs also contribute indirectly to global warming via their

contribution to the formation of ozone, which is a potent greenhouse gas. Because this rulemaking will reduce VOC emissions, and thereby reduce ozone concentrations, we do not expect an increase in global warming.

b. Carbon Dioxide (CO_2)

Carbon dioxide and water vapor limits the transmission of infrared radiation to space in many wavelength regions, particularly in much of the 8-20 um region. However, almost 80 percent of infrared radiation emitted by the surface of the earth escapes to space through an atmospheric, or infrared, window in the electromagnetic spectrum region of 7-13 um, where infrared absorption by CO_2 and water vapor are very weak (Godish, 1991; Graedel and Crutzen, 1993). Synthetic gases such as chlorofluorocarbons (CFC) and HFC absorb strongly in the window region and are therefore much more effective as greenhouse gases than CO_2; on a molecule-for molecule basis, they can be thousands of times more efficient in absorbing infrared energy (Godish, 1991).

CO_2 is the primary man-made greenhouse gas of concern. To a limited extent, CO_2 may replace hydrocarbon propellants in some products. The 2001 Survey data indicate that CO_2 is used in certain consumer products considered for regulation, such as Electrical and Electronic Cleaners. In these cases it is used when flammability is an issue. Although CO_2 has found some use as a replacement propellant in these consumer products, it is not considered a likely replacement for hydrocarbon propellants in other product categories. Therefore, its use in aerosols due to the proposed Regulation, would not likely increase, and any potential increase would be negligible. Therefore, no additional impact on global warming is expected. In addition, most CO_2 used as a propellant is a recycled by-product of existing processes and, therefore, does not increase global warming (ARB, 1999).

c. Hydrofluorocarbons

For some aerosol products to meet the VOC limits in the proposed amendments, manufacturers may choose to replace some or all the typical hydrocarbon propellants with HFC-152a or HFC-134a. These compounds are exempted as VOCs under the Regulation. However, HFC-152a is the chief HFC alternative for hydrocarbon propellants in consumer products due to its significantly lower global warming potential (120) compared to HFC-134a (1300) (Applegate, 1995).

Staff believes that in only in three categories under consideration for regulation, Shaving Gels, Hair Styling Products, aerosol Fabric Refreshers, and Footwear or Leather Care would HFC-152a be a potential reformulation option. Based on the results from the 2001 Survey, the total emissions of HFC-152a from Shaving Gels, if all hydrocarbon driving propellant was replaced with it to meet the future effective VOC limit of 4 percent by weight, would be 0.14 tpd. This is a worst case scenario. Staff believes usage would be considerably less due to other reformulation options available including other non-VOC propellants, such as compressed air or nitrogen, and

alternative packaging. There is a slight potential that aerosol Hair Styling Products, aerosol Fabric Refreshers, and Footwear or Leather Care Products would use HFC-152a. However, emissions in these categories, if all aerosols switched to HFC-152a, would be negligible.

Also, when cost considerations are factored in (HFC-152a is about $1.85 per pound, versus hydrocarbon propellants at $0.25 per pound), it is anticipated that manufacturers will use as little HFC-152a as possible, or none at all, when reformulating their aerosol products. ARB staff does not expect the price of HFC-152a to change appreciably in the near future. Therefore, staff predicts the anticipated HFC-152a emissions as a result of implementation of the Regulation will have a negligible impact on global warming.

Based on 2001 Survey data, HFC-134a is used in Electronic Cleaners as a propellant. HFC-134a is a nonflammable gas and is a good alternative for HCFC propellants, which are being phased-out due to the Montreal Protocol. We do not predict increased usage of this compound due to its higher GWP and because its use is not recommended except in certain specialized uses.

d. Phase-out of Hydrochlorofluorocarbon 141b (HCFC-141b)

Another potential increase in use of global warming compounds would occur as HCFC-141b is phased out due to its propensity to deplete stratospheric ozone. We can not predict how manufacturers of Electrical and Electronic Cleaners will reformulate, once supplies of HCFC-141b have been depleted. However, some data indicate that likely replacements may be global warming compounds such as HFC-43-10mee, HFC-245fa, HFC-365mfc, in combination with hydrofluoroethers (HFE) 7100 and/or HFE 7200. The global warming potentials of these compounds range from 55 for HFE 7200 to 1,500 for HFC-43-10mee (U.S EPA, 2002a). Again, we can not predict how manufacturers would reformulate, but if all HCFC-141b were replaced with these compounds, there would be an emission increase of 0.22 tpd. The actual increase in GWP can not be predicted, however. As always staff will monitor usage through subsequent surveys.

Staff believes that any increase in global warming compound emissions from the proposed amendments relating to VOC emissions (that can be quantified at this time) would be negligible when compared to other sources of anthropogenic global warming compounds in the atmosphere. For example, emissions of CO_2 from fossil fuel combustion represented over 75 percent of global warming-weighted greenhouse gas emissions in 2000 (U.S. EPA, 2002b). Also global warming would be reduced, although slightly, by reducing VOC emissions and, thereby, ozone concentrations.

Other proposed amendments relating to the prohibitions on use of TACs should have no or negligible impact on global warming because replacements are VOCs or exempt compounds which are not powerful global warming compounds.

4. Impact on Stratospheric Ozone Depletion

The ARB staff has determined that the proposed amendments should not have an adverse impact on stratospheric ozone depletion. As detailed below, the compounds of concern, that are currently used in some consumer products, are being phased out. This should result in a net small decrease in stratospheric ozone depletion.

The stratospheric ozone layer shields the earth from harmful ultraviolet (UV) radiation. Depletion of the earth's ozone layer allows a higher penetration of UV radiation to the earth's surface. This increase in UV radiation penetration leads to a greater incidence of skin cancer, cataracts, and impaired immune systems. Reduced crop yields and diminished ocean productivity are also anticipated. Because the chemical reactions which form ground level ozone are driven by UV radiation, it is conceivable that a reduction in stratospheric ozone may also result in an increase in the formation of photochemical smog because of the increased levels of UV radiation on the earth's surface (ARB, 2000c). The chemicals most implicated as causing stratospheric ozone depletion are chlorofluorocarbons (CFCs) and halons (U.S. EPA, 2003). Specifically, the chlorine or bromine atoms released by photolysis of the CFCs or halons react in chain reactions leading to the catalytic destruction of ozone (Finlayson-Pitts and Pitts, 2000).

Because of this climatic problem, the Montreal protocol was enacted in 1989, to phase out a number of CFCs and HCFC. As a signatory of this protocol, the United States, in the Federal Clean Air Act of 1990 established timetables for ceasing production (see part 40, Code of Federal Regulations, section 602). In general, the protocol establishes dates by which certain compounds can no longer be manufactured, however, existing stocks can continue to be used in some applications until exhausted. Of particular concern for this rulemaking is the Class II Substance HCFC-141B that is used in Electronic and Electrical Cleaners. Production of this compound is no longer allowed, but it can continue to be used in electrical cleaning applications until existing stocks are depleted.

To mitigate potential adverse impacts from compliance with the VOC limits, the Regulation already contains a provision that prohibits the use of ozone-depleting compounds in consumer products. However, products already containing an ozone depleting compound can continue to use it, as long as the amount used in the formulation does not increase [see section 94509(e), (f), and (g)]. Because of these provisions, use of HCFC-141b will not increase and will decrease over time, such that stratospheric ozone depletion will be slowed.

However, as mentioned above, the phaseout of this compound could lead to a potential adverse environmental impact because to replace the 0.33 tpd of emissions of HCFC-141b, likely options include VOC global warming compounds such as the HFCs HFC-43-10MEE, HFC-236fa, and HFC-365mfc. These HFCs could be used in conjunction with HFE such as HFE 7100 and HFE 7200. These compounds not only

are implicated as global warming compounds, but are also VOCs as defined in the Regulation.

Because it lacks chlorine, HFC-152a probably contributes only slightly to ozone depletion (Wallington, 1994). As evidence of this, HFC-152a is not included on the list of compounds that are scheduled for phase-out under the federal Clean Air Act requirements. If manufacturers choose HFC-152a as a replacement for hydrocarbon propellants, no additional decrease in stratospheric ozone is expected.

E. POTENTIAL TOXIC AIR CONTAMINANTS IMPACTS

1. Background

As part of our obligations under CEQA the ARB staff is required to evaluate and mitigate potential adverse environmental impacts resulting from regulatory proposals. Also, pursuant to Health and Safety Code section 39650 et seq., the ARB is required to identify and control toxic air contaminants (TACs). The Health and Safety Code defines a TAC as "...an air pollutant which may cause or contribute to an increase in mortality or serious illness, or which may pose a hazard to human health." Moreover, in accordance with section 39666 of the Health and Safety Code, for TACs for which no safe exposure threshold has been established, the ARB is required to ".... reduce emissions to the lowest level achievable through application of best available control technology or a more effective control method...."

Several chemicals currently used in the consumer product formulations considered for regulation have been identified as TACs. An increased or continued use of TACs in any of the consumer product categories considered for regulation could lead to a potential adverse environmental impact. ARB staff has evaluated this potential and has concluded that there would be a potential adverse environmental impact of implementing the VOC limits. Therefore, staff is proposing mitigation measures designed to ensure that use of TACs will be reduced or prohibited, resulting in a positive environmental impact.

Also within this rulemaking we are proposing an ATCM to prohibit the use of PDCB in toilet/urinal care products and air fresheners. Chapter VII contains all of the information relied upon to propose this prohibition, and the health benefits that would be realized. Within the following discussion we focus on the proposal to reduce or prohibit the use of other TACs. Basic findings on the impacts of the proposed ATCM are presented here.

2. VOC Solvents

Volatile organic compound solvents commonly used in consumer products that have been identified as TACs, include xylenes, ethyl benzene, toluene, trichloroethylene, normal hexane, and methyl ethyl ketone (ARB, 2003a). Table IX-2 describes the available data on toxicological endpoints for these compounds. Note that

although TCE is a VOC solvent, its effects will be described along with the other chlorinated solvents below.

Table IX-2
Pollutant-Specific Health Effects for Select VOC TACs of Concern

Compound	Total Emissions TPY[1]	Toxicological Endpoints[2]	
		Acute	Chronic
Xylenes	66.6	Eye, Respiratory System	Nervous System; Respiratory System
Normal Hexane	8.9	N/A	Nervous System
Methyl Ethyl Ketone	27.9	Eyes; Respiratory System	N/A
Toluene	45.6	Central Nervous System	Reproductive; Developmental
Ethyl Benzene	4.9	N/A	Liver; Kidney; Endocrine

1. 2001 Consumer Products Survey data.
2. Toxicological endpoints were obtained from the Office of Environmental Health Hazard Assessment's Acute & Chronic Reference Exposure Levels (Air Toxic Hot Spots Program Risk Assessment Guidelines)

Staff is not proposing specific mitigation measures to reduce these VOC TACs. This is because the Regulation is designed to reduce the VOC content of consumer products. Products containing these compounds will likely have to reduce the amounts of these VOCs contained in current products in order to comply with the applicable VOC limit. The proposed limits would reduce VOC emissions by about 65 percent. Although we can not quantify the reduction at present, compliance with VOC limits should lead to a reduction in the use of TACs, resulting in a positive environmental impact. As always we will continue to monitor the use of these compounds through subsequent surveys to determine usage trends.

3. Chlorinated Solvents

Staff believes that specific mitigation measures are necessary to restrict the use of three chlorinated solvents, Perc, MeCl, and TCE because of their potential to cause cancer. Two of these TACs used in some consumer products, MeCl, and Perc, are specifically exempted from the VOC definition (section 94508 of the Regulation) in recognition of their very low ozone-forming capability. Thus, the potential exists that to meet VOC limits, manufacturers could reformulate using these exempt VOC TACs leading to an adverse impact. Trichloroethylene is regulated as a VOC, such that it's use should not increase as products reformulate to meet VOC limits. However, because of its toxicity impacts we are proposing a specific mitigation measure to address its use.

Below, we provide some general information on toxicity, physical properties and the usage of Perc, MeCl, and TCE.

a. Pollutant-Specific Health Effects Values

Presented below in Table IX-3 are pollutant-specific health effects values developed for Perc, MeCl, and TCE to characterize the relationship between a person's exposure to these TACs and the incidence or occurrence of an adverse health effect. A unit risk factor (URF) or cancer potency factor is used when estimating potential cancer risks and reference exposure levels (RELs) are used to assess potential non-cancer health impacts. Also included in Table IX-3 are the non-cancer acute and chronic toxicological endpoints for Perc, MeCl, and TCE. A further discussion of the health effects that may result from exposure to Perc, MeCl, and TCE follows.

Table IX-3
Pollutant-Specific Health Effects Values Used for Determining Potential Health Impacts [1]

Compound	Cancer Unit Risk Factor $(ug/m3)^{-1}$	Non-cancer Reference Exposure Levels (ug/m3)		Toxicological Endpoints	
		Acute	Chronic	Acute	Chronic
Perchloroethylene (Perc)	5.9 E-6	20,000	35	central nervous system; eye & respiratory irritation	kidney; alimentary system (liver)
Methylene Chloride (MeCl)	1.0 E-6	14,000	400	central nervous system	cardiovascular system; nervous system;
Trichloroethylene (TCE)	2.0 E-6	none	600	none	nervous system; eyes

1. Health effects values and toxicological endpoints were obtained from three sources:

A) Office of Environmental Health Hazard Assessment, Air Toxic Hot Spots Program Risk Assessment Guidelines, Part II, Technical Support Document for Describing Available Cancer Potency Factors, December 2002.

B) All Acute Reference Exposure Levels Developed by the Office of Environmental Health Hazard Assessment, as of May 2000.

C) All Chronic Reference Exposure Levels Adopted by the Office of Environmental Health Hazard Assessment, as of August 2003.

A URF is defined as the estimated upper-confidence limit (usually 95 percent) probability of a person contracting cancer as a result of constant exposure to a concentration of 1ug/m3 over a 70-year lifetime. In other words, using the URF for Perc as an example, which is 5.9×10^{-6} (microgram per cubic meter)$^{-1}$ or $(ug/m^3)^{-1}$, the potential excess cancer risk for a person continuously exposed over a 70-year lifetime to $1ug/m^3$ of Perc is estimated to be no greater than 5.9 chances in 1 million (ARB, 2000a).

A Reference Exposure Level (REL) is used as an indicator of potential non-cancer adverse health effects and is defined as a concentration level at or below which no adverse health effects are anticipated. Reference Exposure Levels are designed to protect most sensitive individuals in the population by including safety factors in their development and can be created for both acute and chronic exposures. An acute exposure is defined as one or a series of short-term exposures generally lasting less than 24 hours. Consistent with risk guidelines, a 1-hour exposure is used to determine acute non-cancer impacts. Chronic exposure is defined as long-term exposure usually lasting from one year to a lifetime. Generally, hazard indices of less than 1.0 are not considered to be a concern to public health. A hazard index is the ratio of the modeled concentration for a toxic pollutant and the reference exposure level for that pollutant (ARB, 2000a).

b. Physical Properties and Potential Health Effects of Perchloroethylene, Methylene Chloride, and Trichloroethylene

This section summarizes the physical properties, emissions, the categories where they are used, and cancer and non-cancer impacts that can result from exposure to Perc, MeCl, and TCE. Table IX-4 shows the total emissions of each solvent in the categories proposed for regulation, as well as the total emissions of these solvents.

Table IX-4
2001 Reported Statewide Emissions of Perc, MeCl, and TCE from Categories of Consumer Products Scheduled for Regulation*

Perc Emissions [pounds/year]	MeCl Emissions [pounds/year]	TCE Emissions [pounds/year]	Total Chlorinated [pounds/year]
146,795	708,293	165,465	1,020,533

* Includes emissions from General Purpose Degreasers

It is important to note that even though the emissions of each solvent may not seem significant, in the case of individual products containing one or more of these solvents, the weight percent can be quite high, ranging from 10 to 100 percent by weight.

l. Perchloroethylene (Perc) or Tetrachloroethylene

aa. Physical Properties of Perc

Perchloroethylene is a volatile chlorinated aliphatic hydrocarbon compound containing a double bond. At room temperature, Perc is a non-flammable, colorless, dense liquid with an ethereal odor. Although relatively insoluble in water, it is miscible in alcohol, ether, chloroform, and benzene. Perc decomposes slowly in water to yield trichloroacetic and hydrochloric acids, and is oxidized by strong oxidizing agents. The physical properties of Perc are shown below in Table IX-5.

Table IX-5
Physical Properties of Perchloroethylene (Perc)

CAS Number:	127-18-4
Molecular Formula:	C_2Cl_4
Molecular Weight:	165.85
Boiling Point:	121 °C at 760 mm Hg
Melting Point:	-22 °C
Vapor Pressure:	18.47 mm Hg at 25 °C
Vapor Density:	5.7 (air = 1)
Density/Specific Gravity:	1.6230 at 20/4 °C
Log Octanol/Water Partition Coefficient:	3.40
Conversion Factor:	1 ppb = 6.78 ug/m^3

bb. Sources and Emissions of Perc

Perchloroethylene is used in General Purpose Degreasers (non-automotive use), Graffiti Removers, Footwear and Leather Care Products, and Electrical Cleaners. Total emissions in these categories are 160,572 pounds per year, or 0.22 tpd.

cc. Health Impacts

Exposure to Perc may result in both cancer and non-cancer health effects. The probable route of human exposure to Perc is inhalation (ARB, 1997).

i. Cancer

The Office of Environmental Health Hazard Assessment (OEHHA) staff has performed an extensive assessment of the potential health effects of Perc, reviewing available carcinogenicity data. OEHHA concluded that Perc is a potential human carcinogen with no identifiable threshold below which no carcinogenic effects are likely to occur. The Board formally identified Perc as a TAC in October 1991 (ARB, 1991). The State of California under Proposition 65 listed Perc as a carcinogen in April 1988 (OEHHA, 2004). Table IX-3 presents the current health effects values that are used for determining the potential health impacts.

In 1990, the U.S. Congress listed Perc as a hazardous air pollutant (HAP) in subsection (b) of Section 112 of the Federal Clean Air Act (42 U.S.C. 7412). The U.S. EPA has classified Perc in Group B2/C, as a probable human carcinogen, on the basis of sufficient evidence for carcinogenicity in animals and inadequate evidence in humans. The International Agency for Research on Cancer (IARC) has classified Perc in Group 2A, as a probable human carcinogen, based on sufficient evidence in animals and limited evidence in humans (ARB, 1997).

Epidemiological studies have provided some indication that the use of dry cleaning solvents, primarily Perc, poses an increased risk of cancer for exposed

workers. However, investigators were unable to differentiate among exposures to various solvents, and other possible confounding factors, like smoking, were not evaluated. Perc increased the incidence of hepatocellular tumors in laboratory mice after oral and inhalation exposure and mononuclear cell leukemia and kidney tumors in rats after inhalation (ARB, 1997).

ii. Non-Cancer

Short-term (acute) and long-term (chronic) exposure to Perc may result in non-cancer health effects. Acute toxic health effects resulting from short term exposure to high levels of Perc may include headaches, dizziness, rapid heartbeat, and irritation or burns on the skin, eyes, or respiratory tract. Massive acute doses can induce central nervous system depression resulting in respiratory failure. Chronic exposure to lower Perc concentration levels may result in dizziness, impaired judgement and perception, and damage to the liver and kidneys (ARB, 2000a). Workers have shown signs of liver toxicity following chronic exposure to Perc, as well as kidney dysfunction and neurological effects. Effects on the liver, kidney, and central nervous systems from chronic inhalation exposure to Perc have been reported in animal studies (ARB, 1997).

In addition to OEHHA listing Perc as having acute and chronic non-cancer RELs (OEHHA, 2000; OEHHA, 2003), the U.S. EPA established an oral Reference Dose (RfD) for Perc of 0.01 milligrams per kilogram per day based on hepatotoxicity in mice and weight gain in rats. The U.S. EPA has not established a Reference Concentration (RfC) for Perc (ARB, 1997). Table IX-3 presents the current health effects values that are used to determine the potential health impacts.

Epidemiological studies of women working in the dry cleaning industry showed some adverse reproductive effects, such as menstrual disorders and spontaneous abortions, but study design prevented significant conclusions. Women exposed to drinking water contaminated with solvents including Perc, showed some evidence of birth defects. Inhalation exposure of pregnant rodents to 300 parts per million Perc produced maternal toxicity and fetotoxicity manifested as developmental delays and altered performance in behavioral tests in the offspring of exposed mice and rats. However, Perc is not considered to be a teratogen (ARB, 1997).

II. Methylene Chloride

aa. Physical Properties of Methylene Chloride

Methylene chloride is a volatile, nonflammable, colorless, liquid with a sweetish chloroform-like odor. It is slightly soluble in water and miscible with alcohol, ether, and dimethylformamide. In the absence of moisture, at ordinary temperatures, MeCl is relatively stable. In dry air, MeCl decomposes at temperatures exceeding 120 °C. Methylene chloride evaporates relatively quickly from water. Possible thermal breakdown products of MeCl include phosgene, chlorine, and hydrogen chloride. The physical properties of MeCl are shown below in Table IX-6.

Table IX-6
Physical Properties of Methylene Chloride (Dichloromethane)

CAS Number:	75-09-2
Molecular Formula:	CH_2Cl_2
Molecular Weight:	84.94
Boiling Point:	39.75 °C at 760 mm Hg
Melting Point:	-95 °C
Vapor Pressure:	349 mm Hg at 20 °C
Vapor Density:	2.93 (air = 1)
Density/Specific Gravity:	1.3255 at 20/4 °C
Log Octanol/Water Partition Coefficient:	1.30
Conversion Factor:	1 ppm = 3.47 mg/m^3

bb. Sources and Emissions of Methylene chloride

Methylene chloride is used in Adhesive Removers, Contact Adhesives, and Electrical Cleaners. Total emissions in these categories are 745,083 pounds per year or 1.02 tpd.

cc. Health Impacts

Exposure to MeCl (also known as dichloromethane) may result in both cancer and non-cancer health effects. The probable route of human exposure to MeCl is inhalation (ARB, 1997).

i. Cancer

The OEHHA staff has performed an extensive assessment of the potential health effects of MeCl, reviewing available carcinogenicity data. The OEHHA staff agreed with U.S. EPA and IARC that MeCl is either a possible or probable human carcinogen with no identifiable threshold below which no carcinogenic effects are likely to occur. The Board formally identified MeCl as a TAC in July 1989 (ARB, 1989). The State of California under Proposition 65 listed MeCl as a carcinogen in April 1988 (OEHHA, 2004). Table IX-3 presents the current health effects values that are used to determine potential health impacts.

In 1990, the U.S. Congress listed MeCl as a HAP in subsection (b) of Section 112 of the Federal Clean Air Act (42 U.S.C. 7412). The U.S. EPA has classified MeCl in Group B2, as a probable human carcinogen. The IARC has classified MeCl in Group 2B, as a possible human carcinogen (ARB, 1997).

ii. Non-Cancer

Short-term (acute) and long-term (chronic) exposure to MeCl may result in non-cancer health effects. MeCl vapor is irritating to the eyes, respiratory tract, and skin. It is also a central nervous system depressant including decreased visual and auditory functions and may cause headache, nausea, and vomiting. Acute toxic health effects resulting from short term exposure to high levels of MeCl may include pulmonary edema, cardiac arrhythmias, and loss of consciousness. Chronic exposure can lead to bone marrow, hepatic, and renal toxicity. MeCl is metabolized by the liver with resultant carboxyhemoglobin formation (ARB, 1997).

OEHHA has adopted for MeCl acute and chronic non-cancer RELs (OEHHA, 2000; OEHHA, 2003), the U.S. EPA established an oral Reference Dose (RfD) for MeCl of 0.06 milligrams per kilogram per day based on liver toxicity in rats, and is currently reviewing a Reference Concentration (RfC) (ARB, 1997). Table IX-3 presents the current health effects values that are used to determine potential health impacts.

No information on adverse reproductive effects in humans from inhalation or oral exposure has been found, but fetotoxicity was observed in pregnant rodents exposed by inhalation to high concentrations of MeCl throughout pregnancy as evidenced by reduced fetal body weight and reduced skeletal ossification (ARB, 1997).

III. Trichloroethylene

aa. Physical Properties of Trichloroethylene

Trichloroethylene is a chlorinated aliphatic hydrocarbon compound containing a double bond. It is a dense, nonflammable, volatile, colorless liquid which is only slightly soluble in water but miscible with organic solvents and other halogenated compounds. Most fixed and volatile oils are dissolved by TCE. It is lipophilic. Trichloroethylene has an odor threshold of 28 parts per million (ppm) and smells similar to ether or chloroform. The physical properties of TCE are shown below in Table IX-7.

Table IX-7
Physical Properties of Trichloroethylene (TCE)

CAS Number:	79-01-6
Molecular Formula	C_2HCl_3
Molecular Weight:	130.40
Boiling Point:	86.7 °C
Melting Point:	-73 °C
Flash Point:	89.6 °C
Vapor Pressure:	100 mm Hg at 32 °C
Vapor Density:	4.53
Density:	1.4649 at 20/4 °C
Log Octanol/Water Partition Coefficient:	2.42
Conversion Factor:	1 ppb = 5.33 ug/m^3

bb. Sources and Emissions of TCE

Trichloroethylene is used in Electrical Cleaners and, and Graffiti Removers. Total emissions in these categories are 181,164 pounds per year or 0.25 tpd.

cc. Health Impacts

Exposure to TCE may result in both cancer and non-cancer health effects. The probable routes of human exposure to TCE are inhalation and ingestion (ARB, 1997).

i. Cancer

The OEHHA staff has performed an extensive assessment of the potential health effects of TCE, reviewing available carcinogenicity data. The OEHHA staff agrees with U.S. EPA and IARC that TCE is a probable human carcinogen with no identifiable threshold below which no carcinogenic effects are likely to occur. The Board formally identified TCE as a TAC in October 1990 (ARB, 1990). The State of California under Proposition 65 listed TCE as a carcinogen in April, 1988 (OEHHA, 2004). Table IX-3 presents the current health effects values that are used to determine potential health impacts.

In 1990, the U.S. EPA listed TCE as a HAP pursuant to subsection (b) of Section 112 of the Federal Clean Air Act (42 U.S.C. 7412). The U.S. EPA has classified TCE in Group B2/C, as a probable human carcinogen. The International Agency for Research on Cancer classified TCE in Group 2A, as a probable human carcinogen, based on sufficient evidence in animals and limited evidence in humans (ARB, 1997).

The U.S. EPA considers the epidemiologic data on TCE carcinogenicity in humans to be inconclusive. Increases in testicular cancer have been reported in inhalation studies in animals. Carcinogenic responses to TCE inhalation studies in animals are increased incidences of hepatocellular carcinoma and adenoma in male

mice; lung adenocarcinomas and malignant lymphomas in female mice; malignant liver tumors in B6C3F1 mice; and renal tumors in rats (ARB, 1997).

ii. Non-Cancer

Short-term (acute) and long-term (chronic) exposure to TCE may result in non-cancer health effects. TCE is a central nervous system depressant and has been used as an anesthetic. It is mildly irritating to the eyes and respiratory tract. Occupational exposure to TCE has resulted in nausea, headache, loss of appetite, weakness, dizziness, ataxia, and tremors. Acute exposures to high concentrations has caused irreversible cardiac arrhythmias, nerve and liver damage and death. Chronic exposure to TCE has also been shown to cause respiratory irritation, renal toxicity, and immune system depression. Alcohol consumption in humans increases the toxicity of TCE and causes "degreaser's flush," which are red blotches on the skin (ARB, 1997).

OEHHA has adopted a chronic non-cancer REL for TCE (OEHHA, 2003). Table IX-3 presents the current health effects values that are used to determine potential health impacts. The U.S. EPA currently is reviewing the Reference Concentration (RfC) and the oral Reference Dose (RfD) for TCE (ARB, 1997).

There is inadequate information to determine whether TCE causes reproductive toxicity in humans. One study reported increased miscarriages in nurses exposed to TCE as well as other anesthetics. An association was found between elevated levels of contaminants, including TCE, in drinking water and congenital heart disease in children. Other studies have not reported adverse reproductive effects in humans exposed to TCE in drinking water. In animal studies, an increase in abnormal sperm morphology in mice exposed by inhalation was reported. Exposure of rats and mice to TCE by inhalation causes a significant delay in fetal maturation and an increase in embryotoxicity (ARB, 1997).

IV. Proposed Mitigation Measures to Address the Use of Perc, MeCl, and TCE

In this Rulemaking staff is proposing to prohibit the use of Perc, MeCl, and TCE in Adhesive Removers (all subcategories), Contact Adhesives, Electrical and Electronic Cleaners, Footwear and Leather Care Products, and Graffiti Removers. We are also proposing to prohibit the use of these compounds in the previously regulated category of General Purpose Degreasers. This proposal is based on data suggesting that there would be potential cancer increases resulting from their use. In proposing this prohibition we are relying on previous work conducted by ARB staff.

Specifically we are relying on three previous rulemakings. To review the complete analyses relied upon to propose these prohibitions, the reader is referred to the following three documents:

1. Initial Statement of Reasons for the Proposed Airborne Toxic Control Measure for Emissions of Chlorinated Toxic Air Contaminants from Automotive Maintenance and Repair Activities, March 10, 2000. (ARB, 2000a)

2. Initial Statement of Reasons for the Proposed Amendments for the California Consumer Products Regulation Relating to Aerosol Adhesives, April 7, 2000. (ARB, 2000b)

3. Initial Statement of Reasons for the Proposed Amendments to the Regulation for Reducing Volatile Organic Compound Emissions from Aerosol Coating Products and Proposed Tables of Maximum Incremental Reactivity Values, and Proposed Amendments to Method 310, "Determination of Volatile Organic Compounds in Consumer Products," May 5, 2000. (ARB, 2000c)

In each of the above rulemakings staff found that use of these chlorinated compounds posed an unnecessary health hazard. Based on modeling results showing the potential for increased cases of cancer, and because many alternative products were available, the ARB, in 2000, prohibited the use of Perc, MeCl, and TCE in General Purpose Degreasers designed for automotive use, Engine Degreasers, Brake Cleaners, Carburetor and Fuel Injection Cleaners, aerosol adhesives, and aerosol coatings.

Below we provide a description of each category where we are proposing to further prohibit the use of Perc, MeCl, and TCE. We also provide relevant information as to emissions, availability of alternatives, and review the data relied upon to support the prohibition in each category.

The proposed prohibition on use of Perc, MeCl, and TCE in Adhesive Removers (all subcategories), Contact Adhesives, Electrical and Electronic Cleaners, Footwear and Leather Care Products, Graffiti Removers, and General Purpose Degreasers would align with State law that requires adverse impacts to be mitigated, and the use of Best Available Control Technology (BACT) in instances where no safe exposure threshold is known. Staff has determined that the proposed prohibition is necessary to mitigate potential adverse impacts that would result from implementing VOC limits for these categories, and to ensure a level playing field among all products.

a. Adhesive Removers

Adhesive Removers are products designed to remove adhesives, gaskets, caulk and other bonding materials from a variety of substrates. Of the four subcategories of Adhesive Removers proposed for regulation MeCl is used in Gasket or Thread Locking Adhesive Removers and Floor or Wall Covering Adhesive Removers. Total emissions of 39,639 and 621,825 pounds per year of MeCl were reported in the 2001 Survey for Gasket or Thread Locking Adhesive Removers and Floor or Wall Covering Adhesive

Removers, respectively. The range of MeCl reported was 61 to 88 percent by weight. Thus, a person's exposure to MeCl could present a health hazard.

i. Floor or Wall Covering Adhesive Removers

Floor or Wall Covering Adhesive Remover are products designed to remove adhesives from wall coverings, such as wallpaper, and flooring, such as vinyl. We have evaluated the potential cancer impacts from using Floor or Wall Covering Adhesive Removers containing MeCl by assuming that the "worst case" exposure scenarios developed to assess health impacts associated with using aerosol adhesives containing MeCl would be analogous. In these instances, at a distance of 20 meters, we found a potential excess cancer increase of 5.8 per million persons for aerosol adhesives. These cancer risks were based on products containing lower percentages of MeCl than were reported for Aerosol Adhesives.

Based on this comparison, we believe it is appropriate to propose a prohibition on the use of MeCl in Floor or Wall Covering Adhesive Removers. Moreover, although they are not currently used, to prevent formulating Floor or Wall Covering Adhesive Remover with Perc or TCE, we are also proposing to prohibit their use as well.

The 2001 Survey data show that there are many alternative products that do not contain MeCl. In fact, almost 60 percent of Floor or Wall Covering Adhesive Removers sold do not contain MeCl. Because alternative products exist, we believe that to adequately protect public health a prohibition on the use of Perc, MeCl, and TCE, in Floor or Wall Covering Adhesive Removers is appropriate.

ii. Gasket or Thread Locking Adhesive Remover

Gasket or Thread Locking Adhesive Remover are products designed to soften and aid in removal of gaskets of various composition from two surfaces. Gasket or Thread Locking Adhesive Remover are likely to be used in scenarios similar to those developed to assess health impacts associated with using automotive products at automotive maintenance and repair (AMR) facilities. It is very likely that the exposure scenarios developed for this ATCM would be applicable to Gasket or Thread Locking Adhesive Removers. Often times gasket removal is associated with automotive repair and they would be used similarly and in similar environments. For our purposes here, we will review a data set from the ATCM.

For this category, we summarize the modeling results from 12 actual AMR facilities using automotive products containing a combination of Perc/MeCl or Perc/TCE. In this case, using SCREEN3 modeling, default meteorology, and at a distance of 20 meters for near-source receptors, the potential excess cancers from using these products ranged from 1 to 46 chances per million persons.

The difference here for Gasket or Thread Locking Adhesive Removers would be that the products contain only MeCl. Because the cancer URF for MeCl is lowest

among the three, the potential excess cancers from using Gasket or Thread Locking Adhesive Removers would likely be less than those reported above for products containing a combination of Perc/MeCl or Perc/TCE (1 to 46 potential excess cancers per million persons). Nevertheless, staff believes the potential excess cancer risk could still be quite high.

Based on this comparison, we believe it is appropriate to prohibit the use of MeCl in Gasket or Thread Locking Adhesive Remover. Moreover, although they are not currently used, to prevent formulating Gasket or Thread Locking Adhesive Remover with Perc or TCE, we are also proposing to prohibit their use as well.

The 2001 Survey data show that there are several alternative products that do not contain MeCl. Although sales of these products are not large, we believe they are effective products and that gaskets can be successfully removed using VOC-based products reformulated to meet the proposed VOC limit. Because alternative products exist, we believe that to adequately protect public health a prohibition on the use of Perc, MeCl, and TCE in Gasket or Thread Locking Adhesive Remover is appropriate.

No General Purpose Adhesive Removers or Specialty Adhesive Removers reported the use of Perc, MeCl, or TCE. However, staff believes that to prevent the use of these compounds, as manufacturers reformulate to meet the proposed VOC limits, a prohibition on their use is appropriate in these categories as well.

b. Contact Adhesives

Contact Adhesives are products designed for application to both surfaces to be bonded together, in which the two surfaces are allowed to dry before being placed in contact with each other. Contact adhesives form an immediate bond that is impossible, or difficult, to reposition and does not need sustained pressure or clamping of surfaces to establish full contact between both surfaces. Of the three chlorinated solvents of concern, only MeCl was reported as used in this category. Total emissions of 4,249 pounds per year of MeCl were reported in the 2001 Survey. Even though the emissions may seem low a person's exposure to MeCl could pose a health hazard.

We have evaluated the potential cancer impacts from using Contact Adhesives containing MeCl by assuming that the "worst case" exposure scenario developed to assess health impacts associated with using aerosol adhesives containing MeCl would be analogous. In this instance, at a distance of 20 meters, we found a potential excess cancer increase of 5.8 per million persons. This cancer risk was based on products containing similar percentages of MeCl as were reported for Contact Adhesives. No analysis for TCE was done for aerosol adhesives because it was found that TCE was not used in these products. However, one scenario considered products containing both Perc and MeCl. In this case, the increased use from the Perc portion of the example product showed an increased potential excess cancer risk of about 27 per million persons at 20 meters. The combined risk for the example product containing

both Perc and MeCl was almost 30 chances for excess cancer occurrences per million persons.

The 2001 Survey data show that MeCl is only used in 1 of 9 Special Purpose Contact Adhesives, and Perc and TCE are not used. Survey data do not indicate the use of Perc, MeCl, or TCE in General Purpose Contact Adhesives.

In discussions with the manufacturer, we have learned that the one product that contained MeCl is no longer for sale in California. The withdrawal from the market is due to the pending prohibition on use of MeCl in Contact Adhesives in the South Coast Air Quality Management District (see Rule 1168), effective in 2005.

Because of the abundance of alternative products, we believe that to adequately protect public health, the proposed prohibition on the use of Perc, MeCl, and TCE in all Contact Adhesives is appropriate. At present, no products containing Perc, MeCl or TCE are sold in California, so the staff's proposal would essentially prohibit manufacturers from beginning to use these solvents as products are reformulated.

c. Electrical and Electronic Cleaners

Electrical Cleaners are products designed to clean heavy greases, oil and other contaminants from electrical equipment such as motors, gears, generators, etc. Electronic Cleaners are products designed to clean light soils and flux from precision electronics such as circuit boards. Of the three chlorinated solvents of concern, all are used in Electrical Cleaners, but none are used in Electronic Cleaners. Total emissions of 162,421 pounds per year of TCE were reported for Electrical Cleaners, in the 2001 Survey. Reported emissions of Perc and MeCl in Electrical Cleaners were 145,407 and 12,120 pounds per year, respectively. The range of TCE contained in Electrical Cleaners was between 95 to 100 percent by weight. The range of Perc reported in Electrical Cleaners was 6 to 100 percent by weight, while reported MeCl ranged from 15 to 58 percent by weight. Thus, a person's exposure to Perc, MeCl, or TCE could pose a health hazard.

We have evaluated the potential cancer impacts from using Electrical and Electronic Cleaners containing these three chlorinated solvents by reviewing the data developed to assess health impacts associated with using automotive products at AMR facilities. It is very likely that the exposure scenarios developed for this ATCM would be applicable to Electrical and Electronic Cleaners—especially Electrical Cleaners. Because of the types of soils removed, we believe Electrical Cleaners and automotive products are used similarly and in similar environments. For purposes here, we will review two data sets from the ATCM.

In the first case we assume a small, generic AMR facility using Perc-containing automotive products, representative meteorology, and a residential receptor at 20 meters. Perc-containing products ranged from 22 to 98 percent by weight Perc. Potential excess cancers in this scenario ranged from 18 to 64 per million persons.

In the second case, we summarize the modeling results from 12 actual AMR facilities using automotive products containing a combination of Perc/MeCl or Perc/TCE. In this case, using SCREEN3 modeling, default meteorology, and at a distance of 20 meters for near-source receptors, the potential excess cancers from using these products ranged from 1 to 46 chances per million persons.

Based on the foregoing, ARB staff concludes that the potential cancer risks from using Electrical and Electronic Cleaners would be similar to those potential risks determined in the ATCM for AMR facilities. The products would likely be used in similar scenarios and the amount of chlorinated compounds in the reported products is similar to the amounts used to model potential cancer risk at AMR facilities using chlorinated solvents.

The 2001 Survey data show that there are many alternative products that do not contain Perc, MeCl, and TCE. In fact, no Electronic Cleaners contain these solvents, and for Electrical Cleaners, 64 percent of sales were for products that do not contain Perc, MeCl, or TCE. Because of the abundance of alternative products, we believe that to adequately protect public health, the proposed prohibition on the use of Perc, MeCl, and TCE, in Electrical and Electronic Cleaners is appropriate. The proposed prohibition on use in Electronic Cleaners, because no products currently contain these solvents, would essentially not allow manufacturers to reformulate using Perc, MeCl, or TCE.

The exception to this prohibition would be for Electrical Cleaners that are used in applications where the equipment is cleaned while there is an active or residual power source. Under the staff's proposal, because of safety concerns related to equipment shorting out, or spark and fire hazard, these "Energized Electrical Cleaners" would be allowed to continue to use Perc, MeCl, and TCE. Based on product labels that were received as part of the 2001 Survey, staff estimates that TAC emissions from Energized Electrical Cleaners would be about 0.04 tpd. Absent HCFC-141b, which is being phased out under the Montreal Protocol (see section D 4 of this chapter), staff is not aware of feasible alternatives to these solvents at this time. Staff will continue to follow progress in technologies to clean energized equipment without the use of chlorinated solvent.

d. Footwear or Leather Care Product

Footwear and Leather Care products are designed to clean, polish, enhance or restore shoes, boots, and other footwear, as well as, leather products such as handbags, jackets, and leather furniture. The Survey data show that only one product, out of over 200 reported, contains Perc, and at a fairly low percentage. Total emissions of 373 pounds per year were reported. The usage of Footwear and Leather Care products is probably not analogous to other scenarios in which we were able to draw parallels with earlier work done to assess potential excess cancer risk. However, because of the plethora of alternative products that function effectively without Perc, we believe that the use of Perc is not needed and presents an unnecessary potential health

hazard. Therefore, staff is proposing to prohibit the use of Perc in Footwear or Leather Care Products. Again, this approach aligns with State law to mitigate potential adverse impacts and require BACT in instances where no safe exposure threshold is known. Even though MeCl and TCE are not reported as used, to prevent their use as products are reformulated, staff is proposing to prohibit their use as well.

e. Graffiti Removers

Graffiti Removers are products designed to remove spray paint and ink graffiti from a variety of substrates, typically without damaging the substrate. They are also used to remove crayon, lipstick and shoe polish. Of the three chlorinated solvents of concern all are used in this category, but mostly in the aerosol product form. Total emissions of 30,460 and 3,044 pounds per year of MeCl and TCE, respectively, were reported in the 2001 Survey. Perc was reported in this category, however to protect confidentiailty the amount is not reported here, but is included in the total Perc emissions shown in IX-4. However, the Perc reported was contained in products using other chlorinated solvents. Even though the emissions of MeCl and TCE may seem low the range of MeCl reported in the products containing these toxics are about 30 to 35 percent by weight. The range of TCE reported is about 40 to 90 percent by weight. Thus, a person's exposure to Perc, MeCl, or TCE could pose a health hazard.

We have evaluated the potential cancer impacts from using Graffiti Removers containing MeCl by assuming that the "worst case" exposure scenarios developed to assess health impacts associated with using aerosol adhesives and aerosol coatings containing MeCl would be analogous. In these instances, at a distance of 20 meters, we found a potential cancer increase of 5.8 and 3.3 per million persons, for aerosol adhesives and aerosol coatings, respectively.

These cancer risks for aerosol adhesives and coatings were based on products containing similar percentages of MeCl as were reported for Graffiti Removers. No analysis for risks associated with Perc or TCE use was done for aerosol adhesives or aerosol coatings because no products contained either solvent. However, we believe that a similar exposure scenario would be appropriate to assess potential cancer increases associated with products containing Perc and/or TCE. Because the cancer URFs for Perc and TCE are higher than that of MeCl (5.9×10^{-6} for Perc; 2.0×10^{-6} for TCE; and $1.0 X^{-6}$ for MeCl) one could assume that the potential cancer risk would be higher than that found for products containing MeCl. Based on this comparison we believe it is appropriate to propose a prohibition on the use of Perc, MeCl and TCE in Graffiti Removers.

The 2001 Survey data show that there are many alternative products that do not contain Perc, MeCl, and TCE. In fact, of the 35 aerosol Graffiti Removers reported, 30 products, representing 86 percent of sales did not contain Perc, MeCl, or TCE. Because of the abundance of alternative products, we believe that to adequately protect public health the proposed prohibition on the use of Perc, MeCl, and TCE in Graffiti Removers is appropriate.

f. General Purpose Degreasers

General Purpose Degreasers are products designed to remove or dissolve grease, grime, oil and other oil-based contaminants from a variety of substrates, including automotive or miscellaneous metallic parts. General Purpose Degreasers were regulated for VOC content in an earlier rulemaking. No changes to the VOC limits for General Purpose Degreasers are proposed in this rulemaking, although, we surveyed this category in 2001 to help categorize other similar product categories. However, in this rulemaking, staff is proposing to prohibit the use of Perc, MeCl, and TCE in this category.

Of the 622 General Purpose Degreasers reported in the 2001 Survey, only 32 products contained one or more of these chlorinated solvents. A review of these labels showed that many products reported were already subject to the AMR ATCM such that use of Perc, MeCl, and TCE had already been prohibited. However, the sell-through period for products subject to the AMR did not end until July 1, 2002, such that it was appropriate to report these products in the Survey. We also found that some Electrical Cleaners had been mistakenly reported as General Purpose Degreasers. Accounting for all of these products resulted in only 2 products containing about 600 pounds of Perc per year. Thus, almost all General Purpose Degreasers have already reformulated to eliminate the use of Perc, MeCl, and TCE. However, to prevent products from being formulated with these compounds staff is proposing to prohibit their use.

General Purpose Degreasers containing chlorinated solvents are used to perform similar functions as those performed by degreasers for automotive use (which were evaluated as part of the ATCM for AMR facilities). It was found that using automotive general purpose degreasers containing Perc, MeCl, and/or TCE posed a potential health hazard. In the ATCM for AMR facilities it was found that in using automotive products containing one or more chlorinated solvents there was an increased cancer risk of between 1 and 46 chances per million people. Staff believes this analysis is applicable to non-automotive use General Purpose Degreasers and that use of these products would pose similar health hazards as those found by using automotive use General Purpose Degreasers.

The 2001 Survey data show that almost all General Purpose Degreasers already do not contain Perc, MeCl, or TCE. Because alternative products exist, we believe that to adequately protect public health proposing a prohibition on the use of Perc, MeCl, and TCE in General Purpose Degreasers is appropriate.

g. Summary

The prohibition on chlorinated solvents is being proposed as a mitigation measure under the California Environmental Quality Act (Public Resources Code section 2100 et seq.). An alternative basis for the prohibition, however, is the authority granted the ARB to control toxic air contaminants (TACs) under Health and Safety Code section 39665 et seq. Chapter VII of this Initial Statement of Reasons contains a

description of California's TAC identification and control program. This section E, comprises the "needs assessment" report for the prohibition on chlorinated solvents, as specified in Health and Safety Code section 39665.

Additional information to support the proposed prohibition on use of Perc, MeCl, and TCE in Adhesive Removers (all subcategories), Contact Adhesives, Electrical and Electronic Cleaners, Footwear and Leather Care Products, Graffiti Removers and General Purpose Degreasers are contained in other documents and within other chapters of this Initial Statement of Reasons. Information regarding sources of these TACs (sources of emissions other than what is discussed in this Chapter) and atmospheric persistence has already been presented in the Initial Statement of Reasons for the Proposed Airborne Toxic Control Measure for Emissions of Chlorinated Toxic Air Contaminants from Automotive Maintenance and Repair Activities, March 10, 2000 (ARB, 2000a). The reader is referred to this document for further information.

More detailed information on alternative products and chemicals that can be used as replacements to Perc, MeCl, and TCE is contained in Chapter VI of this report. Costs for reformulating and cost effectiveness of the proposal is contained in Chapter VIII of this report.

In the federal Clean Air Act Amendments of 1990, the United States Environmental Protection Agency (U.S. EPA) identified Perc, MeCl, and TCE as hazardous air pollutants (HAPs) because evidence indicated the substances may have adverse effects on human health or the environment. As of the writing of this report, the U.S. EPA has not promulgated a comparable NESHAP control measure specifically for consumer products containing Perc, MeCl, or TCE. The U.S. EPA has adopted NESHAP standards which control emissions of these HAPs from other sources. These other measures are described in the ATCM for AMR facilities (ARB, 2000a).

As provided in Health and Safety Code section 39665(c), relevant comments on the proposal to prohibit use of Perc, MeCl, and TCE in seven categories of consumer products, that were received by the ARB, have been included in the administrative record. They are listed as a reference at the end of this Chapter (Toxic Prohibition Comments) and are available from ARB staff upon request for public review and comment.

To summarize, staff finds that the proposed prohibition on use of Perc, MeCl, and TCE in Adhesive Removers (all subcategories), Contact Adhesives, Electrical and Electronic Cleaners, Footwear and Leather Care Products, Graffiti Removers and General Purpose Degreasers is necessary to reduce the health risk associated with use of these compounds. In each category staff has identified the potential for increased chances of contracting cancer from using products containing these compounds. The proposed prohibitions are necessary to mitigate potential adverse impacts that would result from implementing VOC limits for these categories. The prohibitions would also

align with State law that requires use of BACT in instances where no safe exposure threshold is known.

F. RISK ASSESSMENT FOR REDUCED EXPOSURE TO OZONE AND TACS

The actual health risk reductions that would result from reducing VOC emissions, if the staff's proposal were to be adopted, cannot be fully quantified due to lack of appropriate tools and data to characterize the reduced risk. However, qualitatively, we are able to conclude that reducing VOC emissions, in any amount, will result in incremental improvement of the public's health--whether it be in fewer incidences of asthma or hospitalizations, or improvement in lung function.

The VOC reductions from the proposed amendments are designed as partial fulfillment of the State Implementation Plan (SIP), which when fully implemented by 2010, will allow all non-attainment regions of the State to reach attainment for ozone (ARB, 2003b). Thus one can conclude that increments of progress towards attainment improve the public's health. The proposed amendments will also likely reduce PM (SOA). However, our focus here is on reducing ground level ozone, and the impacts of our proposal on SOA formation are not clear, although we do not expect a disbenefit.

The health risks associated with ozone exposure have been known for many years and are discussed in detail in Chapter IV. Studies have shown that when inhaled, even at relatively low levels, ozone can impact lung tissue and lung function. The greatest risk is to those who are more active outdoors during smoggy periods, such as children, athletes, and outdoor workers. Exposure to levels of ozone above the current ambient air standard leads to lung inflammation and lung tissue damage, and a reduction in the amount of air inhaled into the lungs. Recent evidence has, for the first time, linked the onset of asthma to exposure to elevated ozone levels in exercising children (McConnell 2002).

The proposed amendments to the Regulation are designed to achieve the maximum feasible VOC emission reduction from the categories proposed for regulation at this time. Based on predicted emissions in 2009, these reductions from adopting the amendments would result in a total of about 6.8 tpd from 15 product categories. This represents about a 65 percent reduction in VOC emissions from these categories. This compares favorably with other consumer product regulations adopted by ARB. Historically, emission reductions from all regulated categories have been reduced by 50 percent.

Because of the potential health impacts associated with elevated concentrations of ozone, any decrease in ozone precursors, namely VOCs, benefits the health of all Californians.

We are better able to assess the reduced health risk associated with prohibiting the use of the chlorinated solvents Perc, MeCl, and TCE in several categories, and prohibiting the use of PDCB in toilet care and air freshener products. Overall, the

proposed amendments would reduce chlorinated solvent emissions by over 559 tons annually in 2006. Our analysis found that potentially, in a given category, increased cancer risk could be reduced by up to 64 chances per million persons. Overall in these seven categories the potential excess cancer risk associated with their use would be reduced substantially. It should also be noted that the scenarios analyzed to determine increased cancer risk evaluated concentrations in the outdoor air. It is likely that, in indoor environments, workers' and other end-users' chances of increased cancers would be higher from use of products containing these chlorinated solvents.

Regarding the proposed ATCM, emissions of PDCB would be reduced by about 1,219 tons per year in 2006. The number of potential excess cancers potentially avoided, by eliminating the use of PDCB in toilet care products and air fresheners, would be about 9 per million persons, at a distance of 20 meters downwind from the perimeter of the dechlorination process area. For indoor exposures, we found a potential cancer risk of 145 excess cancer cases per million persons. The complete analysis relating to the proposed ATCM for PDCB is found in Chapter VII.

In summary, our health risk analysis shows that, by achieving these VOC reductions, the proposed amendments would reduce health risks posed by ground level ozone by slightly lowering ambient concentrations. The proposed ATCM would have a dual benefit of reducing potential excess cancers and also result in VOC reductions. Moreover, a substantial number of potential excess cancers would likely be avoided by prohibiting the use of chlorinated TACs. Table IX-8 below summarizes the VOC and TAC reductions anticipated in each category.

Table IX-8
Summary of VOC and TAC Reductions in Categories Proposed for Regulation

Product Category	Product Form	Proposed VOC Limit (wt %)	VOC Emission Reductions (TPD)[1]	TAC Emission Reductions (TPD)[2]
Adhesive Removers:				
Gasket or Thread Locking Adhesive Remover	All	50	*-0.011*[3]	
Floor or Wall Covering Adhesive Remover	All	5	0.630	*0.99*
General Purpose Adhesive Remover	All	20	0.258	
Specialty Adhesive Remover	All	70	0.138	
Air Freshener[4]	--	--	0.624	*0.624*[7]
Anti-Static Product	Aerosol	80	0.057 (12/31/08)	--
	Non-aerosol	11	0.000	
Contact Adhesive:				
Contact Adhesive - General Purpose	All	55	0.003	*0.007*
Contact Adhesive - Special Purpose	All	80	0.000[5]	
Electrical Cleaner	All	45	0.070	*0.48*[8]
Electronic Cleaner	All	75	0.049	
Fabric Refresher	Aerosol	15	0.221	--
	Non-aerosol	6	0.220	
Footwear or Leather Care Product	Aerosol	75	0.008	*<0.001*
	Solid	55	0.039	
	All Other Forms	15	0.060	
Graffiti Remover	Aerosol	50	0.014	*0.055*[8]
	Non-aerosol	30	0.071	
Hair Styling Product	Aerosol, Pump Spray	6	0.404	--
	All Other Forms	2	0.163	
Shaving Gel	All	7	0.124	--
		4	0.435 (12/31/09)	
Toilet/Urinal Care Product	Aerosol	10	PD[6]	*2.716*[7]
	Non-aerosol	3	2.709	
Wood Cleaner	Aerosol	17	0.019	--
	Non-aerosol	4	0.232	
		Total Reductions by 2006	**6.05**	4.87
		Total Reductions by 2008	**6.28**	5.01
		Total Reductions by 2009	**6.81**	5.09

1. Survey emissions adjusted for market coverage as discussed in Volume II, Chapter IV; reduction on the effective date of limits which is December 31, 2006, except where otherwise noted.
2. Based on survey emissions; reduction on the effective date of limits which is December 31, 2006.
3. VOC emission increase as result of prohibition on use of certain specified TACs.
4. Currently a regulated category; with elimination of the exemption for 98% para-dichlorobenzene (PDCB) products, additional reductions will be achieved from replacement with lower VOC air fresheners.
5. No reductions; Contact Adhesive was separated into two subcategories and the existing 80% VOC limit was retained for this subcategory.
6. PD = Protected Data; reductions omitted to protect manufacturers' confidential information.
7. PDCB emissions are also included in VOC Emission Reductions.
8. Trichloroethylene emissions are also included in VOC Emission Reductions.

G. OTHER POTENTIAL ENVIRONMENTAL IMPACTS

Solid Waste Disposal

We do not expect an adverse impact on solid waste disposal from the proposed amendments relating to VOC limits, or the proposed prohibition on use of chlorinated solvent TACs Perc, MeCl, and TCE. The Regulation is designed so that all current product forms will be available. Because of this, we do not anticipate any changes in packaging or disposal due to the amendments.

With regard to the proposed ATCM, staff has evaluated whether there would be an increase in solid waste due to prohibiting the use of PDCB in toilet/urinal care products and air fresheners. If PDCB products are prohibited, the use of alternative products for toilet and urinal care could create more waste from the disposal of plastic screens, plastic containers, and VOC medium used for alternative products.

Staff found that both PDCB and alternative products create waste. Some PDCB urinal products use plastic screens, while some alternative products are blocks sold without screens. For toilet bowls, both the PDCB and alternative products must use plastic or metal hangers for toilet bowl rims. The products sold in plastic containers will not be typical replacements for the PDCB products. For example, we do not expect the use of air freshener sprays for room deodorizing to substantially increase, because the alternative urinal and toilet bowl block products are already available.

We have no information showing that greater use of the alternative products would create a new and environmentally significant solid waste or other disposal problem. Even if alternative products do create additional waste, we would consider the small increase in solid waste to be out-weighed by the substantial benefits of reducing potential increased cancer risk from continued use of PDCB.

Impacts on Waste Water

Sanitation districts have been concerned about the amount of chlorinated compounds found in the waste effluent at treatment plants. Currently, many treatment plants do not have the equipment necessary to process industrial wastes such as chlorinated compounds and these compounds have been detected at elevated levels at some facilities. Over the last several years, increased influent concentrations of Perc were observed at several wastewater treatment plants. The influent concentrations of Perc have been high enough to potentially cause violations of the plants' discharge limit of 5 micrograms per liter (ug/L) (ARB, 2000a). Regarding PDCB, according to data from the Los Angeles County Sanitation District, influent levels of PDCB ranged from 2 to 5 ug/L; with effluent levels ranging from 1 to 2 ug/L.

Use of Adhesive Removers (all subcategories), Contact Adhesives, Electrical and Electronic Cleaners, Footwear and Leather Care Products, Graffiti Removers and General Purpose Degreasers would not typically have a waste water fate. However, the

proposed removal of Perc, MeCl, and TCE from these categories proposed for regulation may result in a reduction in the amount of chlorinated solvents reaching the storm drains and the waste water treatment plants if these products have been misused or improperly discarded.

On the other hand, PDCB toilet care products do have a waste water fate. Because the proposed limits for toilet/urinal care products effectively prohibit the use of PDCB, we would expect to nearly eliminate PDCB from waste water influent levels. This results in reduced cancer risk.

Staff also evaluated if the use of alternative products for toilet and urinal care would create any other waste water impact if PDCB products are prohibited. This is because some plastics in the alternative products dissolve into the flush water, or may contain other VOCs.

VOC medium, such as alcohol, may be used in some products, although most of the alternative products are solids with no VOC medium. We do not expect the VOC medium to cause a waste disposal problem, since the user would be knowingly throwing away useful product carried by the medium. Medium that enters sewer systems would be readily treated by wastewater treatment plants and would not be a solid waste issue. Representatives of "publicly owned treatment works" (POTWs) support our proposal (see next section), and do not cite VOC ingredients from alternatives to be an issue at treatment works. Our Consumer Products Program takes into account any VOC medium that may be used, for determining product compliance with VOC standards, and for determining VOC emissions and emission reductions.

In written comments, representatives of POTWs strongly support our proposal to essentially prohibit the use of PDCB products now marketed for toilets and urinals. The representatives also strongly support the use of alternative products already available, and have not indicated any water quality problem associated with the plastic screens, plastic containers, or ingredients of the alternative products. Instead, the representatives provided compelling data showing that it is the PDCB products, specifically, that are causing a significant wastewater pollution problem, with an associated air quality problem. Removal of the PDCB products from the marketplace will essentially mitigate both problems (Green, 2004; Martyn, 2004).

In summary, with regard to solid waste and water quality impacts, staff finds that the proposed rulemaking would not likely adversely impact solid waste or water quality. In fact, the proposal should result in no impact on solid waste and should have a positive impact on water quality.

H. POTENTIAL FLAMMABILITY OF PRODUCTS THAT CONTAIN VOCS

Comments have been received which express concern that usage of the chlorinated solvents in Electrical Cleaners is necessary--especially in areas where cleaning is performed while the equipment is energized, or when cleaning may occur

near flame, heat, or other ignition sources. Staff agrees that there is a need for non-flammable solvents such as Perc, MeCl, and TCE, to clean electrical equipment that must be cleaned while there is an active or residual power source. We are not proposing to prohibit use of these compounds in these applications. While we agree that the cleaning of energized electrical equipment poses a risk, flammability is a lessor concern in other applications, for example in cleaning low voltage electrical equipment such as automobiles.

We note that when the ATCM for AMR facilities was developed, staff could find no evidence of reports of fires, injuries, or other incidents related to the use of non-chlorinated products in AMR facilities. This conclusion was arrived at by conducting a search of statewide and national databases, as well as by making inquiries to fire departments and associations across the State. Additionally, the California State Fire Marshal's office indicated that the combustion of gasoline, such as from a leaking fuel line, poses a significantly greater flammability concern than the use of potentially flammable aerosol products. (ARB, 2000a)

Instead, discussions with AMR facility operators indicated that most facilities consider all aerosol products flammable and use common safety precautions when using these products. Therefore, flammability is sufficiently addressed by the use of good operating practices on the part of facility owners, mechanics, and technicians. (ARB, 2000a)

We believe common safety precautions, as well as, good operating practices, in combination with allowing Perc, MeCl, and TCE-containing products to continue to be used to clean energized electrical equipment, address the issue of flammability.

I. STATE IMPLEMENTATION PLAN (SIP) IMPACT

On October 23, 2003, the ARB adopted *the Proposed 2003 State and Federal Strategy for the California State Implementation Plan* (Statewide Strategy) which reaffirms the ARB's commitment to achieve the health-based air quality standards through specific near-term actions and the development of additional longer-term strategies. The Statewide Strategy identifies the Board's near-term regulatory agenda to reduce ozone and particulate matter by establishing enforceable targets to develop and adopt new measures for each year from 2003 to 2006, including commitments for the Board to consider 19 specific measures.

The measures outlined in the adopted Statewide Strategy are being incorporated into SIP revisions. The Statewide Strategy will update all elements of the approved 1994 SIP and includes additional consumer products measures. Upon approval by U.S. EPA, the 2003 SIP will replace the State's commitments in the 1994 SIP. Together with significant reductions from stationary industrial facilities, mobile sources, and other areawide sources, the reductions in the consumer products element of the SIP are an essential part of California's effort to attain the air quality standards.

The ARB has committed, in the Statewide Strategy, to develop a measure to be proposed to the Board by 2004 and implemented by 2006 that would reduce VOC emissions from consumer products by at least 5.3 tons per day (tpd) statewide in 2010. The amendments to the consumer products regulation proposed in this document are intended to fulfill this commitment.

In addition to the SIP commitment, as part of a lawsuit settlement (see Chapter I, section C 4), ARB staff committed to propose to the Board by June 30, 2004, a control measure for a 2 tpd VOC emission reduction in the South Coast Air Basin. The amendments to the consumer products regulation proposed in this report are intended to fulfill the 2 tpd commitment and to partially fulfill the remaining VOC reduction commitment in the lawsuit settlement agreement.

J. ENVIRONMENTAL JUSTICE

State law defines environmental justice as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies. The ARB is committed to evaluating community impacts of proposed regulations, including environmental justice concerns.

Consumer products are considered area sources and, as such their use is not focussed in a particular area leading to a potential "hot spot." Generally, use of consumer products is fairly uniform across the State, tracking with housing units, and their emissions are spread over the course of a day, rather than concentrated at a particular time of day. For these reasons, we do not believe that people of any given race, culture, or income would be more impacted than any others would. All Californians should benefit equally from the reduction in VOC emissions from the consumer product categories proposed for regulation, as well as from the prohibition on use of chlorinated solvents that are TACs in the categories containing them.

Because the proposed limits for toilet/urinal care products effectively prohibit the use of PDCB, we would expect to nearly eliminate PDCB from waste water influent and effluent levels. As a result, PDCB concentrations in the air near Publicly Owned Treatment Works (POTWs) will be reduced. The lowering of PDCB levels in effluents from POTWs across the state would provide an environmental benefit to the communities where they are located, including low income communities and communities of color.

REFERENCES

Air Resources Board, Technical Support Document. Proposed Identification of Methylene Chloride as a Toxic Air Contaminant, Part B Report. May 1989. (ARB, 1989)

Air Resources Board, Staff Report/Executive Summary, and Part B. Proposed Identification of Trichloroethylene as a Toxic Air Contaminant. August 1990. (ARB, 1990)

Air Resources Board, Initial Statement of Reasons for Rulemaking, Staff Report/Executive Summary, and Part B. Proposed Identification of Perchloroethylene as a Toxic Air Contaminant. August 1991. (ARB, 1991)

Air Resources Board. Toxic Air Contaminant Identification List – Summaries. September 1997. (ARB, 1997)

Air Resources Board, Technical Support Document. Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation. September 10, 1999. (ARB, 1999)

Air Resources Board, Staff Report. Initial Statement of Reasons for the Proposed Airborne Toxic Control Measures for Emissions of Chlorinated Toxic Air Contaminants from Automotive Maintenance and Repair Activities. March 10, 2000. (ARB, 2000a)

Air Resources Board, Staff Report. Initial Statement of Reasons for the Proposed Amendments to the California Consumer Products Regulation Relating to Aerosol Adhesives. April 7, 2000. (ARB, 2000b)

Air Resources Board. Initial Statement of Reasons for the Proposed Amendments to the Regulation for Reducing Volatile Organic Compound Emissions from Aerosol Coating Products and Proposed Tables of Maximum Incremental Reactivity (MIR) Values, and Proposed Amendments to Method 310, "Determination of Volatile Organic Compounds in Consumer Products. May 5, 2000. (ARB, 2000c)

Air Resources Board. 2001 Consumer and Commercial Products Survey. September 24, 2002. (ARB, 2003a)

Air Resources Board. Proposed 2003 State and Federal Strategy for the California State Implementation Plan. August 25, 2003. (ARB, 2003b)

Air Resources Board. Initial Statement of Reasons for Proposed Amendments to the Tables of Maximum Incremental Reactivity (MIR) Values. October 17, 2003. (ARB 2003c)

Applegate, L. E. HFC-152a: A Valuable Propellant for the Reduction of Volatile Organic Compounds. Spray Technology & Marketing. April, 1995, pp. 44-46. (Applegate, 1995)

Bowman, F.M., Pilinis, C. and Seinfeld, J.H. Ozone and aerosol productivity of reactive organics. Atmospheric Environment, Volume 29, 1995, pp. 579-589. (Bowman et al., 1994)

Carter, W.P.L. Documentation of the SAPRC-99 Chemical Mechanism for VOC Reactivity Assessment. Final report to California Air Resources Board, Contract No. 92-329 and No. 95-308. (Carter, 2000)

Carter, W.P.L. Telephone conversation with Dr. Dongmin Luo, ARB, regarding photochemical reactivity of Para-dichlorobenzene. (April, 2004)

Finlayson-Pitts, B.J. and J.N. Pitts Jr. Chemistry of the Upper and Lower Atmosphere. Chapter 9, Academic Press, New York, 2000. (Finlayson-Pitts and Pitts, 2000)

Godish, Thad. Air Quality. Lewis Publishers, Inc., Chelsea, Michigan, 1991. (Godish, 1991)

Graedel, T.E., and Crutzen, Paul, J. Atmospheric Change: an Earth System Perspective. W.H. Freeman and Company, New York, 1993. (Graedel and Crutzen, 1993)

Green, Sharon. Letter dated January 5, 2004, regarding Initial Staff Proposal for 2004 Consumer Products Regulation Amendments. (Green, 2004)

Griffin, R.J., Cocker III, D.R., and Seinfeld, J.H. Incremental aerosol reactivity: application to aromatic and biogenic hydrocarbons. Environmental Science & Technology, Volume 33, 1999, pp. 2403-2408. (Griffin et al., 1999)

Grosjean, D. and J.H. Seinfeld. Parameterization of the Formation Potential of Secondary Organic Aerosols. Atmospheric Environment, Volume 23, 1989, pp. 1733-1747. (Grosjean and Seinfeld, 1989)

Grosjean, D. *In situ* organic aerosol formation during a smog episode: estimated production and chemical functionality. Atmospheric Environment, Volume 26A, 1992, pp. 953-963. (Grosjean, 1992)

Harner, T. and Bidleman, T.F. Octanol-air partition coefficient for describing particle/gas partitioning of aromatic compounds in urban air. Environmental Science & Technology, Volume 32, 1998, pp. 1494-1502. (Harner and Bidleman, 1998)

Johnson, C.E. and R.G. Derwent. Relative Radiative Forcing Consequences of Global Emissions of Hydrocarbons, Carbon Monoxide, and NOx from Human Activities Estimated with a Zonally-averaged Two-dimensional Model. Climatic Change, Volume 34, 1996, pp. 4439-4462. (Johnson and Derwent, 1996)

Kleindienst, T.E., Smith, D.F., Li, W., Edney, E.O., Driscoll, D.J., Speer, R.E., and Weathers, W.S. Secondary organic aerosol formation from the oxidation of aromatic hydrocarbons in the presence of dry submicron ammonium sulfate aerosol. Atmospheric Environment, Volume 33, 1999, pp. 3669-3681. (Kleindienst et al., 1999)

Martyn, Paul. Letter dated January 6, 2004, regarding Initial Staff Proposal for 2004 Consumer Products Regulation Amendments. (Martyn, 2004)

McConnell, R., et al. Asthma in exercising children exposed to ozone: A cohort Study. Lancet, 2002, pp. 359:386-391. (McConnell et al., 2002)

Moolgavkar, S.H. and Luebeck, E.G. A critical review of the evidence on particulate air pollution and mortality. Epidemiology, Volume 7, 1996, pp. 420-428. (Moolgavkar and Leubeck, 1996)

Odum, J.R., T. Hoffmann, F. Bowman, D. Collins, R.C. Flagan, and J.H. Seinfeld. Gas/Particle Partitioning and Secondary Organic Aerosol Yields. Environmental Science & Technology, Volume 30, 1996, pp. 2580-2585. (Odum et al., 1996)

Office of Environmental Health Hazard Assessment (OEHHA). All Acute Reference Exposure Levels Developed by the Office of Environmental Health Hazard Assessment as of May 2000. wysiwyg://http://www.oehha.ca.gov/air/acute_rels/allAcRELs.html (OEHHA, 2000)

Office of Environmental Health Hazard Assessment (OEHHA). All Chronic Reference Exposure Levels Adopted by OEHHA as of August 2003. wysiwyg://http://www.oehha.ca.gov/air/acute_rels/ALLChrels.html (OEHHA 2003)

Office of Environmental Health Hazard Assessment (OEHHA). Air Toxic Hot Spots Program Risk Assessment Guidelines, Part II, Technical Support Document for Describing Available Cancer Potency Factors. December, 2002. (OEHHA, 2002)

Office of Environmental Health Hazard Assessment (OEHHA). State of California, Environmental Protection Agency, Office of Environmental Health Hazard Assessment, Safe Drinking Water and Toxic Enforcement Act of 1986, Chemical Known To The State To Cause Cancer And Reproductive Toxicity. August, 1999. (OEHHA, 2004)

Pandis, S.N., R.A. Harley, G.R. Cass, and J.H. Seinfeld. Secondary Organic Aerosol Formation and Transport. Atmospheric Environment, Volume 26A, 1992, pp. 2269-2282. (Pandis et al., 1992)

Pankow, J.F. An absorption model of gas/particle partitioning of organic compounds in the atmosphere. Atmospheric Environment, Volume 28, 1994, pp. 185-188. (Pankow, 1994a)

Pankow, J.F. (1994b) An absorption model of the gas/aerosol partitioning involved in the formation of secondary organic aerosol. Atmos. Environ. 28, 189-193. (Pankow, 1994b)

Seinfeld, J.H. and Pandis, S.N. Atmospheric chemistry and physics-from air pollution to climate change. John Wiley & Sons, Inc. 1998, pp. 1326. (Seinfeld and Pandis, 1998)
Schwartz, J., Dockery, D.W., and Neas, L.M. Is daily mortality associated specifically with fine particles. Journal of Air & Waste Management Association, Volume 46, 1996, pp. 927-939. (Schwartz et al., 1996)

Toxic Prohibition Comments. Comment letters received by ARB on the proposal to prohibit use of Perc, MeCl, and TCE in Adhesive Removers (all subcategories), Contact Adhesives, Electrical and Electronic Cleaners, Footwear and Leather Care Products, Graffiti Removers and General Purpose Degreasers. (Toxic Prohibition Comments)

United States Environmental Protection Agency. Environmental Indicators: Ozone Depletion.
http://www.epa.gov/spdpublc/science/indicat/ (U.S. EPA, 2003)

United States Environmental Protection Agency. Greenhouse Gases and Global Warming Potential Values, Excerpts from the inventory of U.S. Greenhouse Emissions and Sinks: 1990-2000. U.S. Greenhouse Gas Inventory Program, Office of Atmospheric Programs, U.S. Environmental Protection Agency. April, 2002. (U.S. EPA 2002a)

United States Environmental Protection Agency. In Brief: The U.S. Greenhouse Gas Inventory. EPA 430-F-02-008. Office of Air and Radiation (6204N), Washington, DC 20460. April, 2002. (U.S. EPA, 2002b)

Wallington, T. J., Schneider, W F., Worsnop, D. R., Nielsen, O. J., Sehested, J., Debruyn, W. J., and Shorter, J. A. The environmental impact of CFC replacements--HFCs and HCFCs. Environmental Science & Technology, Volume 28, 1994, pp. 320-326. (Wallington et al., 1994)

Wang, S.C., R.C. Flagan, and J.H. Seinfeld. Aerosol Formation and Growth in Atmospheric Organic/NO_x Systems-I. Outdoor Smog Chamber Studies of C_7- and C_8-Hydrocabrons. Atmospheric Environment, Volume 26, 1992, pp. 403-420. (Wang et al., 1992)

Wigley, T.M.L., S.J. Smith, and M.J. Prather. Radiative Forcing due to Reactive Gas Emissions. Journal of Climate, Volume 5, 2002, pp. 2690-2696. (Wigley et al., 2002)

Yu J., Cocker III, D.R., Griffin, R.J., Flagan, R.C., and Seinfeld, J.H. Gas-Phase ozone oxidation of monoterpenes: gaseous and particulate products. Journal of Atmospheric Chemistry, Volume 34, 1999, pp. 207-258. (Yu et al., 1999)

X.

FUTURE ACTIVITIES

In this Chapter, we present future activities of the Board's consumer products program. During the summer of 2004, staff will begin developing the 2003 Consumer and Commercial Products Survey (2003 Survey). The 2003 Survey will be comprehensive in nature and will be used as the basis for upcoming rule makings in 2005 and 2006. In addition, staff has committed to another survey in 2006 for the 2005 sales year, which will be used as the basis for another rulemaking in 2008. For each of these future activities staff will consult with interested parties through the same workgroup process (see Chapter II) that has been employed over the last 15 years. Each of the activities listed above are described in detail below.

A. 2003 CONSUMER AND COMMERCIAL PRODUCTS SURVEY

The 2003 Consumer Products Survey (2003 Survey) will be conducted in the latter half of 2004 and will cover product formulations and sales occurring in the 2003 calendar year. The 2003 Survey will be a comprehensive survey encompassing most categories of consumer products. Staff intends to survey every major and minor category of consumer products except most of those surveyed during the 2001 Consumer and Commercial Products Survey (2001 Survey), and those regulated categories with limits becoming effective in 2004 and 2005. Some categories included in the 2001 Survey may need to be re-surveyed for 2003 sales because staff believes that there was poor response or coverage, or results obtained indicate that the sales in 2001 may have been in contrast to available market information.

The format of the 2003 Survey will be quite similar to that of the 2001 Survey. Staff intends to use very similar forms and instructions. In addition, as was done for the 2001 Survey, staff will be providing an automated electronic means to submit the survey information. Areas of difference between the 2001 and 2003 surveys may include more extensive speciation of Low Vapor Pressure VOCs (LVP-VOCs) and a more complete discussion of the fact that participating in the survey is mandatory.

The 2003 survey will be used as a basis for future regulatory amendments in 2005 and 2006 as discussed below. Staff intends to work closely with all affected parties in the development of the 2003 Survey, by creating a workgroup of interested parties.

B. 2005 AND 2006 CONSUMER PRODUCTS REGULATORY AMENDMENTS

Per the State Implementation Plan (SIP) and the SIP Lawsuit settlement, (please see discussion in Chapter IV), ARB must achieve between four and eight tons per day (tpd) of VOC emission reductions from consumer products in the South Coast Air Basin. These reductions are equivalent to approximately 10-15 tpd statewide by 2008. This will be accomplished by two separate rule makings, one by December 31, 2005, and a

second by December 31, 2006. The results of the 2003 Survey will be used as a basis for these rulemakings. Staff anticipates re-evaluating the larger categories of consumer products for additional emission reduction opportunities. In addition, smaller regulated and unregulated categories will be evaluated. Staff will focus on achieving reductions through mass-based limits, but where appropriate may consider the setting of reactivity-based standards. As always, staff will be analyzing existing low emitting products, emerging technologies and alternative packaging systems.

C. 2005 CONSUMER AND COMMERCIAL PRODUCTS SURVEY

Another survey, the 2005 Consumer Products Survey (2005 Survey) will be conducted in 2006 and will cover product formulations and sales occurring in the 2005 calendar year. The 2005 Survey will cover those products that were not surveyed in the 2003 Survey. Products included will be those regulated categories with limits becoming effective in 2004 and 2005 and will include Aerosol Coating Products. Once again, the format of the survey should be similar to that of the 2001 and 2003 surveys, and staff will form a workgroup of interested parties in the development of the survey.

D. 2008 CONSUMER PRODUCTS REGULATORYAMENDMENTS

Per the State Implementation Plan (SIP) and the SIP Lawsuit settlement, (please see discussion Chapter IV), ARB must achieve an additional 10-20 tpd reductions statewide from consumer products by 2010. This rulemaking will focus on those categories not regulated in the 2005 or 2006 rulemakings. Staff anticipates looking at innovative approaches to achieve the reductions including but not limited to alternative packing technologies, limits for general categories of products, and zero and near zero emission technologies. Staff will focus on achieving reductions through mass-based limits, but where appropriate, may consider the setting of reactivity-based standards.

E. FURTHER REDUCTIONS FROM CONSUMER PRODUCTS

As was discussed in Chapter IV, in addition to the reduction strategies specified for each category, the SIP requires significant additional emission reductions from long-term strategies. These reductions will need to come from all categories including consumer products. Therefore, ARB staff is required to evaluate whether further reductions from Consumer Products other than those specified in the SIP from measures CONS-1 and CONS-2, can be obtained.