APPENDIX A:
Technical Support Document

I.

INTRODUCTION

A. OVERVIEW

This Technical Support Document presents our technical justification and analysis of the proposed amendments. It is part of the Initial Statement of Reasons (ISOR) for Proposed Amendments to the California Consumer Products Regulation and the Aerosol Coatings Regulation. The proposed amendments to the Consumer Products and Aerosol Coatings Regulations (2006 Amendments) are intended to partially fulfill the first half of the CONS-2 commitment of the consumer products element in the Proposed 2003 State and Federal Strategy for the California State Implementation Plan (Statewide Strategy, 2003, or SIP), and fulfill the requirements of a SIP lawsuit settlement agreement reached with environmental groups. The proposed 2006 Amendments can be found in Appendix B of this document.

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 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). This section, along with subsequent amendments, requires the Air Resources Board (ARB or Board) to adopt regulations to achieve the maximum feasible reduction in volatile organic compound (VOC) emissions from consumer products. Prior to adoption, the Board must determine 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.

C. BACKGROUND

1. Existing Consumer Product Regulations

To date, the Board has taken several actions to fulfill the legislative mandate pertaining to the regulation of consumer products including antiperspirants and deodorants and aerosol coating products. Three regulations have been adopted setting limits for a total of 112 consumer product categories with 145 VOC limits and 36 categories of aerosol coatings. In addition, two voluntary regulations, the Alternative Control Plan and the Hairspray Credit Program have been adopted to provide compliance flexibility to companies. These five regulations are found in Title 17, California Code of Regulations, sections 94500 to 94575:

- Antiperspirants and Deodorants (Article 1, sections 94500-94506.5);

- Consumer Products (Article 2, sections 94507-94517);

- Aerosol Coating Products (Article 3, sections 94700-94701);

- Alternative Control Plan (Article 4, sections 94540-94555); and

- Hairspray Credit Program (Article 5, sections 94560-94575).

ARB staff developed, and the Board approved, the Consumer Products Regulation in three phases. Phase I was approved in 1990, Phase II was approved in 1997, and Phase III (also known as Midterm Measures I and II) was approved in two regulatory actions in 1997 and 1999. In addition, a fourth “phase” was initiated with the 2004 Amendments and will continue with this rulemaking and subsequent rulemakings in 2007 and 2008. A complete summary of consumer products program regulatory actions with dates of regulatory amendments are provided in Appendix E.

2. Consumer Products and the State Implementation Plan (SIP)

State Implementation Plans

Federal clean air laws require areas with unhealthy levels of ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide and inhalable particulate matter to develop SIPs describing how they will attain national ambient air quality standards (NAAQS). The 1990 amendments to the federal Clean Air Act set new deadlines for attainment based on the severity of the pollution problem and launched a comprehensive planning process for attaining the NAAQS. The promulgation in 1997 of the new national eight-hour ozone standard and the fine particulate matter ($PM_{2.5}$) standards and designation in 2004 of nonattainment areas will result in additional statewide air quality planning efforts. In response to new federal regulations, future SIPs will also address ways to improve visibility in national parks and wilderness areas.

A SIP is a compilation of new and previously submitted plans, programs (such as monitoring, modeling, permitting, etc.), district rules, and State and federal regulations. Many of California's strategies apply statewide, including emission standards for cars and heavy-duty trucks, fuel regulations, and limits on emissions from consumer products. State law makes ARB the lead agency for all purposes related to the SIP. Local air districts and other agencies, such as the Department of Pesticide Regulation, prepare SIP elements and submit them to ARB for review and approval. ARB forwards SIP revisions to the United States Environmental Protection Agency (U.S. EPA) for approval and publication in the Federal Register. The Code of Federal Regulations Title 40, Chapter I, Part 52, Subpart F, Section 52.220 lists all of the items which are included in the California SIP. Some California submittals are pending U.S. EPA approval.

1994 California State Implementation Plan for Ozone

On November 15, 1994, the ARB adopted the California State Implementation Plan for Ozone (1994 SIP). Achieving significant VOC reductions from consumer products is a key element of the 1994 SIP. The consumer products element of the 1994 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 amendments to the Consumer Products Regulation. Consumer products rulemaking actions to date are summarized in Appendix E: Summary of Regulations Adopted and Dates of Regulatory Amendments.

2003 State and Federal Strategy and 2003 South Coast SIP

On October 23, 2003, the ARB adopted the 2003 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 2008, including commitments for the Board to consider 19 specific measures. In addition, it 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. It also describes feasible approaches to reduce emissions from sources under the jurisdiction of the federal government.

ARB's commitments have been incorporated into the revised SIPs for the South Coast and San Joaquin Valley, and will be included as needed in SIP revisions for other parts of California expected over the next several years. Additional emission reductions are needed in both areas to meet the existing federal air quality standards. In addition to meeting federal requirements, this Strategy ensures continued progress towards California's own health-based standards.

The South Coast Air Quality Management District adopted the 2003 Air Quality Management Plan on August 1, 2003. The ARB approved the local SIP element and the State and federal strategy 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. Thus, the elements of 2003 Statewide Strategy became part of the California SIP submittal package. Further, the emissions benefits of the statewide measures identified would then be realized not only in the South Coast Air Basin, but statewide. The San Joaquin Valley Unified Air Pollution Control District adopted the 2004 State Implementation Plan for Ozone in the San Joaquin Valley on October 8, 2004. The ARB approved the 2004 San Joaquin Valley SIP on October 28, 2004, and submitted it to the U.S. EPA for federal approval on November 15, 2004, as a revision to the California SIP. The 2003 SIP updates all elements of the approved 1994 SIP and includes additional consumer products measures.

Together with significant reductions from stationary industrial facilities, mobile sources, and other area-wide sources such as architectural coatings and petroleum marketing, 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 were intended to reduce emissions from consumer products:

- **Measure CONS-1: Set New Consumer Products Limits for 2006.** In the 2003 Statewide Strategy, ARB committed to present a measure to the Board by 2004 (2004 Amendments). The measure 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. The ARB has fulfilled this commitment. On June 26, 2004, the Board adopted a CONS-1 measure (the "2004 Amendments"), which will achieve 3.0 tpd in VOC emission reductions in the South Coast Air Basin by 2010, and achieve 6.9 tpd

in VOC emission reductions statewide by 2010. The adopted CONS-1 measure became legally effective on June 20, 2005, with implementation of the CONS-1 VOC limits beginning on December 31, 2006 (ARB, 2004).

- **Measure CONS-2: Set New Consumer Products Limits for 2008-2010.** The ARB also committed to present new consumer product category limits to the Board between 2006 and 2008 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.

  The current proposal is intended to partially fulfill ARB's commitment for CONS-2 to achieve 4.9 tpd in VOC emission reductions in the South Coast Air Basin by 2010, and achieve 11.5 tpd in VOC emission reductions statewide by 2010. We are developing a subsequent proposal for presentation to the Board in March 2007 (the "2007 Amendments"), to consider related proposals that have been deferred at the request of interested stakeholders to allow more time for review of technical issues.

  The remainder of the CONS-2 commitment is expected to be fulfilled with further rulemakings, beginning in 2007 with preparation of the 2006 sales year survey package (2006 survey) for distribution to industry. Rule adoption is scheduled for 2008, with rule implementation 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. As such, there is an ongoing commitment to pursue additional technologically and commercially feasible reductions in consumer product emissions.

Future State Implementation Plans

In July 1997, the U.S. EPA established a new federal eight-hour ozone standard and fine particulate matter ($PM_{2.5}$) standards (U.S. EPA, 1997a, 1997b). On April 15, 2004, U.S. EPA designated 15 areas of California nonattainment for the new eight-hour ozone standard effective June 15, 2004 (U.S. EPA, 2004a). Many, but not all of these areas were 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. The one-hour standard was 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 requires that all emission reduction commitments and specific measures identified in the 2003 Statewide Strategy must be fulfilled, even though the 2003 SIP has not been "approved" by U.S. EPA. In addition,

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.

SIPs demonstrating attainment of the new federal ozone and particulate matter standards must be adopted by the local air districts and ARB. The ozone plans are due to the U.S. EPA by June 2007. U.S. EPA designated the South Coast and San Joaquin Valley as non-attainment areas for the federal $PM_{2.5}$ standard, effective April 5, 2005. $PM_{2.5}$ plans are due to the U.S. EPA by April 2008[1] (U.S. EPA, 2004b). In response to new federal regulations, future SIPs will also address ways to improve visibility in national parks and wilderness areas. See Chapter IX, Future Activities, for more details regarding local air districts required to prepare plans, related activities and schedule. Up-to-date information on SIP activities can be found on ARB's website at: http://www.arb.ca.gov/planning/sip/sip.htm.

The preliminary draft of the State Strategy for Meeting Federal Air Quality Standards is scheduled to be released in the fall of 2006, and staff is currently holding workshops and soliciting comments. This planning document will commit ARB to further control the sources under its jurisdiction to the extent necessary to meet the standards and protect public health. The emission reduction targets in the preliminary State Strategy are challenging – significant reductions are needed from every major source category in order to meet our air quality goals in the most polluted areas of the State. The consumer product category is a significant source of VOC emissions statewide. As indicated in Tables I-1 and I-2, next page, consumer products are among the top VOC sources in the South Coast Air Basin and San Joaquin Valley Air Basin. Consumer product emissions will be the single largest VOC source category, comprising 24.5%, in the South Coast Air Basin by 2020, overtaking light-duty passenger cars as the top source category (ARB 2006 Almanac). By 2020, consumer product emissions will be the third largest VOC source category, comprising 8.8%, in the San Joaquin Valley Air Basin. It is therefore expected that there will be a Consumer Products element of the future 2007 Ozone SIP which will set forth a specific commitment that further emission reductions from Consumer Products will be needed.

3. 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 (Settlement, 1999). The settlement agreement was amended twice, in December 1999 and in June 2003 (Settlement, 1999). Although the 2003 SIP revision is intended to replace

[1] On September 21, 2006, U.S. EPA announced a more stringent 24-hour PM standard. Final designations for the new standard are scheduled to be promulgated in 2009 (U.S. EPA, 2006).

Table I-1
Top Ten Emitting Categories in the South Coast Air Basin
In 2010 and 2020

2010 Ranking	2020 Ranking	Source Category	2010 ROG (tpd)	2010 % of Total	2020 ROG (tpd)	2020 % of Total
2	1	Consumer Products	112.0	19.8%	120.7	24.5%
1	2	Light Duty Passenger Cars	159.8	28.2%	86.8	17.6%
4	3	Coatings (Paints and Thinners - non architectural)	33.3	5.9%	38.0	7.7%
3	4	Off-Road Equipment (Lawn and Garden)	34.2	6.0%	31.1	6.3%
5	5	Architectural Coatings (Paints and Thinners)	25.5	4.5%	28.5	5.8%
7	6	Petroleum Marketing (Gasoline Evaporative Losses)	21.7	3.8%	23.2	4.7%
9	7	Degreasing	15.5	2.7%	17.5	3.6%
8	8	Heavy Duty Gas Trucks	19.3	3.4%	13.5	2.8%
6	9	Recreational Boats	21.8	3.8%	13.0	2.7%
12	10	Chemical (Process and Storage Losses)	10.0	1.8%	11.7	2.4%
10	11	Gas Cans	10.2	1.8%	10.8	2.2%
-	-	Other Sources	103.5	18.2%	97.4	19.7%
-	**-**	**Total**	**566.8**	**100%**	**492.2**	**100%**

Source: ARB 2006 Almanac

Table I-2
Top Ten Emitting Categories in the San Joaquin Valley Air Basin
In 2010 and 2020

2010 Ranking	2020 Ranking	Source Category	2010 ROG (tpd)	2010 % of Total	2020 ROG (tpd)	2020 % of Total
3	1	Livestock Waste (Dairy Cattle)	45.0	11.5%	59.8	15.7%
1	2	Prescribed Burning	48.1	12.4%	47.1	12.3%
4	3	Consumer Products	27.8	7.2%	33.4	8.8%
5	4	Oil and Gas Production (Evaporative Losses)	26.7	6.9%	23.8	6.2%
2	5	Light Duty Passenger Cars	45.0	11.6%	23.4	6.1%
6	6	Pesticides	22.6	5.8%	21.8	5.7%
7	7	Coatings (Paints and Thinners – Non Architectural)	13.8	3.5%	17.4	4.6%
9	8	Petroleum Marketing (Gasoline Evaporative Losses)	11.5	3.0%	13.2	3.5%
8	9	Food and Agriculture (Crop Processing and Wineries)	12.0	3.1%	13.1	3.4%
10	10	Architectural Coatings (Paints and Thinners)	9.8	2.5%	10.8	2.8%
-	-	Other Sources	127.0	32.8%	117.6	30.8%
-	**-**	**Total**	**389.4**	**100%**	**381.6**	**100%**

Source: ARB 2006 Almanac

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. ARB staff committed to specific consumer products measures that are in the 2003 Strategy, CONS-1 and CONS-2 control measures. Included in the list of specific measures, the ARB staff committed to develop a measure by 2004 and implement by 2006, that would achieve VOC emission reductions from consumer products of at least 2.3 tpd in the South Coast Air Basin by 2010. Staff's proposal for the CONS-1 measure was approved by the Board on June 24, 2006 and fulfilled the 2.3 tpd emission reduction in the South Coast Air Basin. The amendments to the Consumer Products and Aerosol Coatings Regulations proposed in this report are intended to partially fulfill the 8.5 to 15 tpd emission reduction in the South Coast Air Basin and fulfills the remaining VOC reduction commitment in the lawsuit settlement agreement.

4. 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)" (U.S. EPA, 1998). 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 ARB's more stringent second tier standards, mid-term measures categories, or aerosol coatings. The national regulation achieves a 20 percent reduction in VOC emissions while California's existing consumer products and aerosol coatings regulations have already achieved a 50 percent reduction in the regulated categories. Because California has unique air quality problems, we must reduce VOC emissions from all categories including consumer products to the maximum extent feasible to attain the federal and State ambient air quality standards for ozone.

REFERENCES

1. 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. May 7, 2004. (ARB, 2004)

2. Air Resources Board. The California Almanac of Emissions and Air Quality – 2006 Edition. 2006. (ARB 2006 Almanac)

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

4. 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)), Final January 23, 1999; First Amendment to Settlement Agreement, December 9, 1999; Second Amendment, June 25, 2003. (Settlement, 1999)

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

6. United States Environmental Protection Agency. National Ambient Air Quality Standards for Ozone; Final Rule. Federal Register. July 18, 1997, Volume 62, Number 138, Page 38855-38896, available at http://www.epa.gov/fedrgstr/EPA-AIR/1997/July/Day-18/a18580.htm. (U.S. EPA, 1997a)

7. United States Environmental Protection Agency. National Ambient Air Quality Standards for Particulate Matter; Final Rule. Federal Register. July 18, 1997, Volume 62, Number 138, Page 38651-38701, available at http://www.epa.gov/fedrgstr/EPA-AIR/1997/July/Day-18/a18577a.htm. (U.S. EPA, 1997b)

8. United States Environmental Protection Agency. "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)." (U.S. EPA, 1998)

9. 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, 2004a)

10. United States Environmental Protection Agency. Air Quality Designations and Classifications for the Fine Particles (PM2.5) National Ambient Air Quality Standards. December 17, 2004. (U.S. EPA, 2004b)

11. United States Environmental Protection Agency. National Ambient Air Quality Standards for Particulate Matter. September 21, 2006. (U.S. EPA, 2006)

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 2006 Amendments and the staff evaluation of emission reduction strategies. In order to involve the public in the development of the proposed 2006 Amendments, a subcommittee of the Consumer Products Working Group, titled the Consumer Products Regulation Workgroup (CPRWG), was established in 2004. Participation in the CPRWG was open to any member of the public. The CPRWG participated in the development of the 2003 Consumer and Commercial Products Survey (2003 Survey) and 2006 Amendments. Numerous meetings were held with the CPRWG during the development of the 2003 Survey and, later, during the development of the 2006 Amendments. The 2003 Survey and related efforts are described in more detail below in section C.

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:

- Adhesives and Sealants Council
- American Beauty Association
- American Chemistry Council
- Automotive Aftermarket Industry Association
- Automotive Specialty Products Association
- California Fire Chief Association
- California Grocers Association
- California League of Food Processors
- Consumer Specialty Products Association
- Cosmetic, Toiletry, and Fragrance Association
- Fire District Association of California
- Fragrance Materials Association
- International Sanitary Supply Association
- Motor & Equipment Manufacturers Association
- National Aerosol Association
- National Paint and Coatings Association
- Soap and Detergent Association
- Western Aerosol Information Bureau

In addition, representatives from local air districts and agencies, including the South Coast Air Quality Management 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 1,300 subscribers.

Four public CPRWG meetings and one public workshop were conducted between January 2006 and September 2006 to develop the 2006 Amendments. At the first workgroup meeting on January 19, 2006, staff discussed the logistics and timeline for the upcoming consumer products regulatory activity. The meeting also served as a forum for communication regarding the 2003 Consumer and Commercial Products Survey Preliminary Data Summaries, and the development and schedule for the upcoming rulemaking process of the 2006 Amendments.

At the second CPRWG meeting on March 27, 2006, staff discussed the additions and adjustments made to the 2003 Consumer and Commercial Products Survey Preliminary Data Summaries. Staff also discussed a draft initial list of categories proposed for regulation.

At the third CPRWG meeting on June 1, 2006, staff discussed the development of the consumer products regulations that will be presented to the Board in November 2006. Staff also discussed the draft regulatory categories and initial draft proposed VOC limits, and other agenda items related to the regulatory effort.

At the fourth CPRWG meeting on July 25, 2006, staff discussed the draft regulatory category definitions with modified proposed VOC limits and other regulatory changes.

On August 25, 2006, staff released the Third Staff Proposal for Category Standards, Proposed Regulatory Categories, and other items to be addressed for the proposed 2006 Amendments. A key element of these documents was notification that the 2006 Amendments were to be bifurcated into two Board actions, one in November 2006 and another in 2007 (2007 Amendments).

At the Public Workshop for the 2006 Amendments on September 14, 2006, the staff proposal for modification to the Consumer Products Regulation was presented to the interested parties.

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

To solicit additional information and comments, staff held numerous individual meetings, and teleconferences, 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 2006 Amendments.

ARB Planning Staff also held meetings with consumer product industry representatives to discuss the upcoming revision to the State Implementation Plan (SIP). Specifically addressed were ARB's inventory and modeling updates, which demonstrates the great need for further emission reductions from all source categories, including consumer products, to attain the new federal and State ambient air quality standards. Industry representatives were also invited to attend ARB's October 12, 2006, SIP Planning Symposium (Symposium). The Symposium will be an opportunity for all interested parties to provide input on the development of the 2007 SIP.

Table II-1
Chronology of Workgroup Meetings and Public Workshop

Date	Meeting	Location
January 19, 2006	1st Workgroup Meeting for the CPRWG	Sacramento, CA with teleconference available
March 27, 2006	2nd Workgroup Meeting for the CPRWG	Sacramento, CA with teleconference available
June 1, 2006	3rd Workgroup Meeting for the CPRWG	Sacramento, CA with teleconference available
July 25, 2006	4th Workgroup Meeting for the CPRWG	Sacramento, CA with teleconference available
September 14, 2006	1st Public Workshop for the 2006 Amendments	Sacramento, CA with teleconference available

B. STATUTORY REQUIREMENTS FOR EMISSION REDUCTIONS

In enacting section 41712 of the HSC, the Legislature gave the ARB authority to control emissions from a very diverse number of products sold statewide to household and commercial consumers. According to section 41712, "Consumer product" means a chemically formulated product used by household and institutional consumers, including, but not limited to, detergents; cleaning compounds; polishes; floor finishes; cosmetics; personal care products; home, lawn, and garden products; disinfectants; sanitizers; aerosol paints; and automotive specialty products; but does not include other paint products, furniture coatings, or architectural coatings.

Section 41712 requires the Board to adopt regulations to achieve the maximum feasible reduction in volatile organic compounds emitted by consumer products after making certain determinations. Prior to adoption, the Board must determine that adequate data exist to establish that the regulations are necessary to attain State and

federal ambient air quality standards and the regulations are commercially and technologically feasible and necessary. The regulations adopted by the Board can not require the elimination of a product form. Product form refers to the shape and structure of the product, such as liquid, solid, powder, gel, crystal, aerosol, or pump spray. Chapter III. Technical Basis for the Proposed Amendments describes the guidelines established by ARB staff to ensure that these statutory criteria are met.

The Board must consider the effect that the regulations proposed for health benefit products, antimicrobial products registered with the U.S. EPA, will have on the efficacy of those products in killing or inactivating agents of infectious diseases such as viruses, bacteria, and fungi. The Board must consider the impact the regulations will have on the availability of health benefit products to California consumers and consider recommendations from health professionals when developing VOC control measures for health benefit products.

The Board must also comply with its volatile organic compound emission reduction obligations under the 1994 State Implementation Plan (SIP), or any amendments thereto. ARB's SIP commitments are described in both the Executive Summary and in Chapter I. Introduction.

C. STAFF EVALUATION OF EMISSION REDUCTION OPPORTUNITIES

Development of the proposed 2006 Amendments began with the review of the 2003 Consumer and Commercial Products Survey (2003 Survey), conducted in 2004 and 2005 (ARB, 2003). The 2003 Survey requested information on about 250 categories of consumer products. These 250 categories comprise about two-thirds of the overall consumer products emissions inventory or about 160 tpd. Over 915 companies responded to the 2003 Survey with information on over 26,000 products. The 2003 Survey, in conjunction with an additional survey to be conducted in 2006, was designed to obtain the comprehensive information necessary to develop new consumer product emission standards that together would achieve a minimum emission reduction of 20-35 tpd by 2010.

The focus of the 2003 Survey was primarily on categories where an opportunity for emission reductions was identified. Complete data was needed to accurately develop the emissions inventory and to assess emission reduction opportunities for specific categories of consumer products. The reductions are needed to meet commitments in the SIP and SIP lawsuit settlement agreement. Reductions will be achieved through the setting of mass-based and possibly reactivity-based standards.

After the 2003 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 at the current time. As a result of this process, staff initially identified 61 product categories for potential emission reduction opportunities which included 21 previously unregulated categories.

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.

During the workgroup and workshop process, staff presented specific proposals and alternatives to the public for consideration. The proposed VOC limits were developed based on the 2003 Survey results, input from interested parties, and identified repackaging opportunities and reformulation options. 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 to the public, considering interested party comments, and performing data analyses, and as a result is currently proposing VOC limits for 15 product categories. The total VOC emissions from the 15 identified categories comprised approximately 26.2 tpd statewide in 2003.

D. ALTERNATIVES CONSIDERED

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 alternative 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 which would result in failure to meet our CONS-2 SIP and SIP lawsuit settlement commitments (See Chapter I. Introduction). 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. 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. 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, 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 initially considered more than 50 categories for regulation. Upon further analysis of available information, other State and federal agency comments and industry comments, some categories were eliminated from consideration. After consulting with several health organizations, including the California Department of Health Services, staff determined the proposed limits would make the products ineffective. Accordingly, staff eliminated personal hand sanitizers from consideration. Staff believed, based on the available information, that it was not appropriate to regulate every category initially proposed. Considering all available information, staff determined that at this time 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 without further investigation.

However, staff is continuing to evaluate the technical feasibility of proposing VOC limits for a number of categories. These categories were identified in the Third Staff Proposal for Categories- March 2007, released on August 25, 2006, and available at: http://www.arb.ca.gov/consprod/regact/cpwg2006/cpwg2006.htm.

For this current action, staff is proposing 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 112 product categories with 145 VOC limits, and 36 categories of aerosol coatings achieving a 50 percent reduction in emissions from the regulated categories.

REFERENCE

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2003)

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 HSC section 41712 added a constraint 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, the 2004 Amendments and now for the 2006 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 2006 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. Where there is low complying market share, lower emission technology exists that can provide a pathway for compliance. There are no complying products currently available in the market place for aerosol sanitizers or aerosol carburetor or fuel-injection air intake cleaners, although 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.

In setting the proposed limits for the 2006 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.

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 U. S. EPA 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..." (HSC 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 impossible 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 2006 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. ARB staff believes that this approach complies with HSC section 41712.

IV.

NEED FOR EMISSION REDUCTIONS

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 STANDARDS

Federal and State ambient air quality standards have been established to protect California's population from the harmful effects of ozone and PM. An ambient air quality standard sets legal limits on the level of an air pollutant in the outdoor (ambient) air necessary to protect public health. Both the ARB and the U.S. EPA are authorized to set standards. A table summarizing the current federal and State ambient air quality ozone and PM standards is provided in Table IV-1.

VOC emissions from consumer products contribute to the formation of both ozone and fine PM. Other sources of VOCs include emissions from fuel combustion, coatings and paints. PM pollution 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, NO_x, sulfur oxides and other chemicals in the atmosphere.

1. Ozone

Ozone formation in the lower atmosphere results from a series of chemical reactions between VOCs and nitrogen oxides in the presence of sunlight. 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. Ninety-three percent of Californians, or 35 million people, live in areas designated as nonattainment for the federal 8-hour ozone standard. California experienced 41 percent of the total national exposure based on analysis of population exposure conducted by ARB staff for the years 2000 through 2002 (ARB, 2006c). California occupies the top five spots and has six out of the top ten areas with the highest levels of ozone (2004 design values).

It has been well documented that ozone adversely affects respiratory function of humans and animals. Human health studies show that short-term exposure to ozone injures the lung (ARB, 2005, 2000b, 1997; U.S. EPA, 2006a, 1996). In some animal

studies, permanent structural changes with long-term exposures to ozone concentrations considerably above ambient were seen; these changes remain even after periods of exposure to clean air (U.S. EPA, 2006a, 1996). Exposure to levels of ozone above the current ambient air quality standard can lead to lung inflammation, lung tissue damage, and a reduction in the amount of air inhaled into the lungs. Ozone is a strong irritant that can cause constriction of the muscle cells in the airways that result in symptoms such as coughing, chest tightness, shortness of breath, and increased asthma symptoms (ARB, 2005; U.S. EPA, 1996). Ozone in sufficient doses can also increase the permeability of lung cells, rendering them more susceptible to toxins and microorganisms. Health effects associated with ozone exposure include hospitalizations, school absences, and premature mortality (ARB 2005).

The greatest risk is to those who are active outdoors during smoggy periods, such as children, athletes, and outdoor workers. Recent evidence suggests that ozone may be linked to the onset of new asthma in very active children (McConnell 2002). Ozone has also been associated with premature death. For the year 2005, premature deaths from ozone exposure in California are estimated at 630 deaths per year (ARB, 2005).

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 (USDA, 2006). ARB studies indicate that ozone pollution damage to crops is estimated to cost agriculture over $500 million dollars annually (ARB, 1987; 2006a).

2. Fine Particulate Matter

PM is a complex mixture of tiny particles that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in shape, size and chemical composition, and can be made up of many different materials such as metals, soot, soil, and dust. As described above, PM can be directly emitted from sources, such as diesel PM, or can be produced indirectly from sources which emit precursors that are converted to PM by atmospheric processes. Particles 10 microns or less in diameter are defined as "respirable particulate matter" or "PM_{10}". PM_{10} and particles 2.5 microns or less in diameter ($PM_{2.5}$) can be inhaled deep into the lungs. $PM_{2.5}$ contributes significantly to regional haze and reduction of visibility in California. Besides reducing visibility, the acidic portion of PM (nitrates, sulfates) can harm crops, forests, aquatic and other ecosystems (ARB, 2002).

Extensive research indicates that exposure to outdoor PM_{10} and $PM_{2.5}$ levels exceeding current air quality standards is associated with increased risk of hospitalization for lung and heart-related illness, including emergency room visits for

asthma. PM exposure is also associated with increased risk of premature deaths, primarily in the elderly and people with pre-existing cardiopulmonary disease. Premature deaths linked to PM_{10} and $PM_{2.5}$ exposure are now at levels comparable to deaths from motor vehicle accidents and second-hand smoke. In children, studies have shown associations between PM exposure and reduced lung function, increased respiratory symptoms, and illnesses (ARB, 2002).

The ARB funded a long-term epidemiologic study that investigated the respiratory health of children in 12 cities in Southern California know as the "Children's Health Study" (CHS, 2004). The air quality in these 12 communities varies from good to moderate and poor. In the final report on the Children's Health Study, that was published on May 14, 2004, major results of the study included the following findings:

- Children living in communities with higher concentrations of $PM_{2.5}$, nitrogen dioxide, elemental carbon, and acid vapor have reduced lung function growth at age 18 than children growing up in cleaner communities. The concern is that this may represent an irreversible effect.

- Increased levels of acid vapor, ozone, nitrogen dioxide and PM_{10} were associated with reduced lung function growth.

- Children living in high ozone communities who participate in several team sports may be at greater risk of developing asthma than less active children living in the same communities.

- Children who moved away from their initial study community had increased lung function growth if their new community had lower PM levels, and had decreased lung function growth if their new community had higher PM levels. Moving to a cleaner community may not completely compensate for the reduced growth associated with higher levels of air pollution.

- School absences due to respiratory illnesses are significantly higher on days with higher ozone levels.

- Children with asthma who were exposed to high concentrations of PM were more likely to develop bronchitis.

3. Ambient Air Quality Standards

The federal and State ambient air quality standards for ozone and PM are shown in Table IV-1. In April 2005, the Board reviewed California's 1-hour standard for ozone and determined that it alone was not sufficiently protecting human health. Consequently, ARB adopted a new 8-hour standard at 0.070 parts per million (ppm) for ozone while retaining the existing 1-hour ozone standard at 0.09 ppm. California's new 8-hour ozone standard at 0.070 ppm is more stringent than the federal 8-hour ozone standard of 0.08 ppm. In 1997, the U.S. EPA replaced the national 1-hour ozone

standard of 0.12 ppm with an 8-hour ozone standard of 0.08 ppm (U.S.EPA, 1997a). Regarding particulate matter, in 2002, the Board passed new, stricter standards for PM. The newly adopted standards include a PM_{10} annual average standard of 20 micrograms per cubic meter ($\mu g/m^3$), and a new annual average $PM_{2.5}$ standard of 12 $\mu g/m^3$. Also, the State PM_{10} standard for a 24-hour period is 50 $\mu g/m^3$. The national 24-hr standard for PM_{10} is 150 $\mu g/m^3$, and for $PM_{2.5}$ it is 65 $\mu g/m^3$.

Table IV-1
Ambient Air Quality Standards for Ozone and $PM_{10 \text{ and } 2.5}$[1]

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	0.070 ppm	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 $\mu g/m^3$

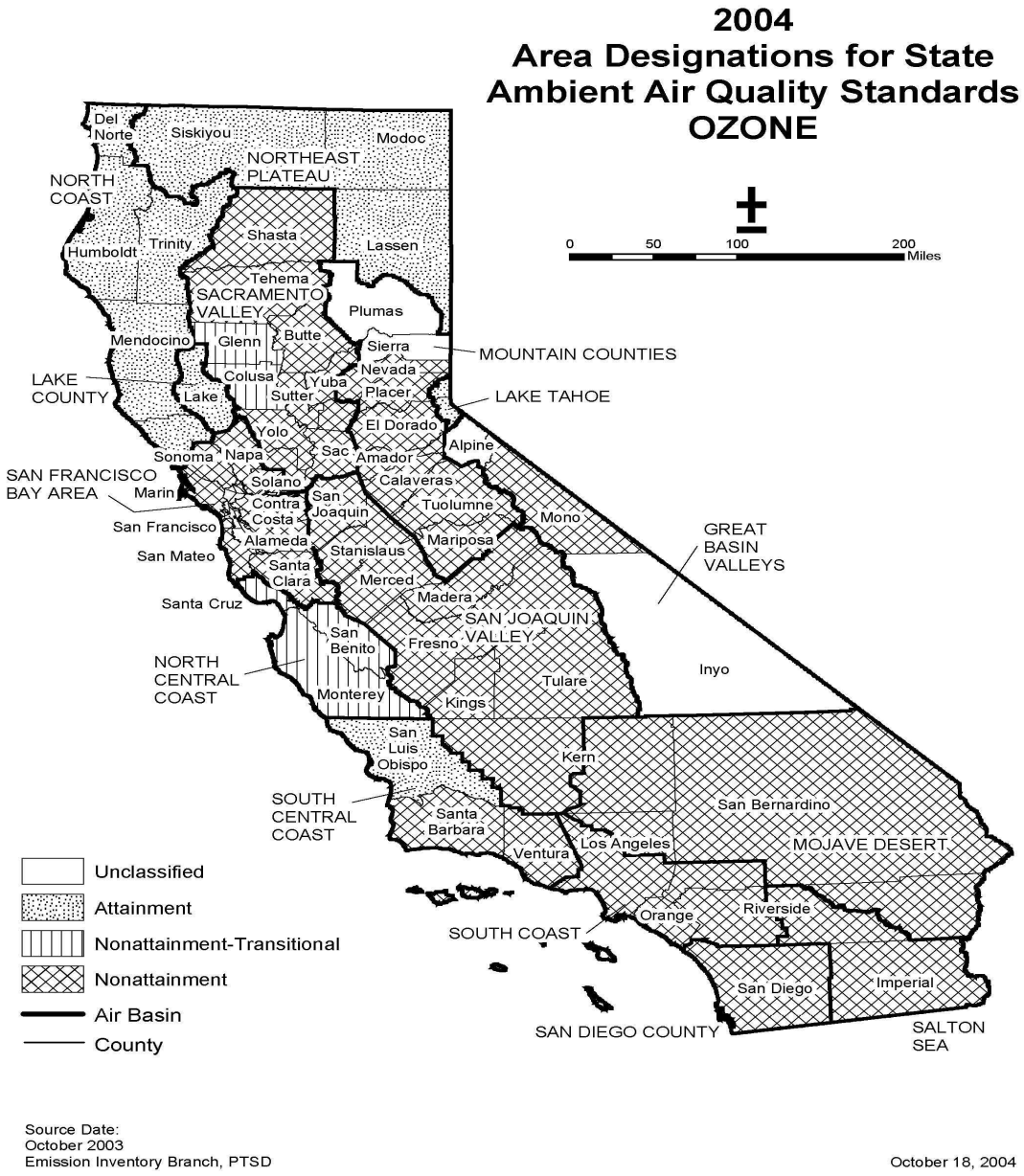
Source: Air Resources Board, Ambient Air Quality Standards, May 17, 2006 (ARB, 2006b).

4. Area Designations

The CCAA was enacted in 1988, and has the fundamental goal that all areas of California are to attain the State ambient air quality standards for ozone by the earliest practicable date. As specified in the CCAA, the ARB has designated areas of California to be in "attainment" or "nonattainment" for the State ozone standards. Figures IV-1 and IV-2 show that unhealthy levels of ozone and $PM_{2.5}$ are not limited to just urban areas, but can be found in nearly every county in California. The figures show the counties designated as nonattainment (or nonattainment-transitional, which is a subcategory of nonattainment) for the year 2004, for the State ozone and $PM_{2.5}$ standards. These maps clearly indicate the extent and magnitude of the ozone and $PM_{2.5}$ problems in California. ARB has plans to update area designations in Fall 2006 and expect numerous areas will be re-designated non-attainment.

[1] On September 21, 2006, U.S. EPA announced a more stringent 24-hour PM standard. Final designations for the new standard are scheduled to be promulgated in 2009 (U.S. EPA, 2006b).

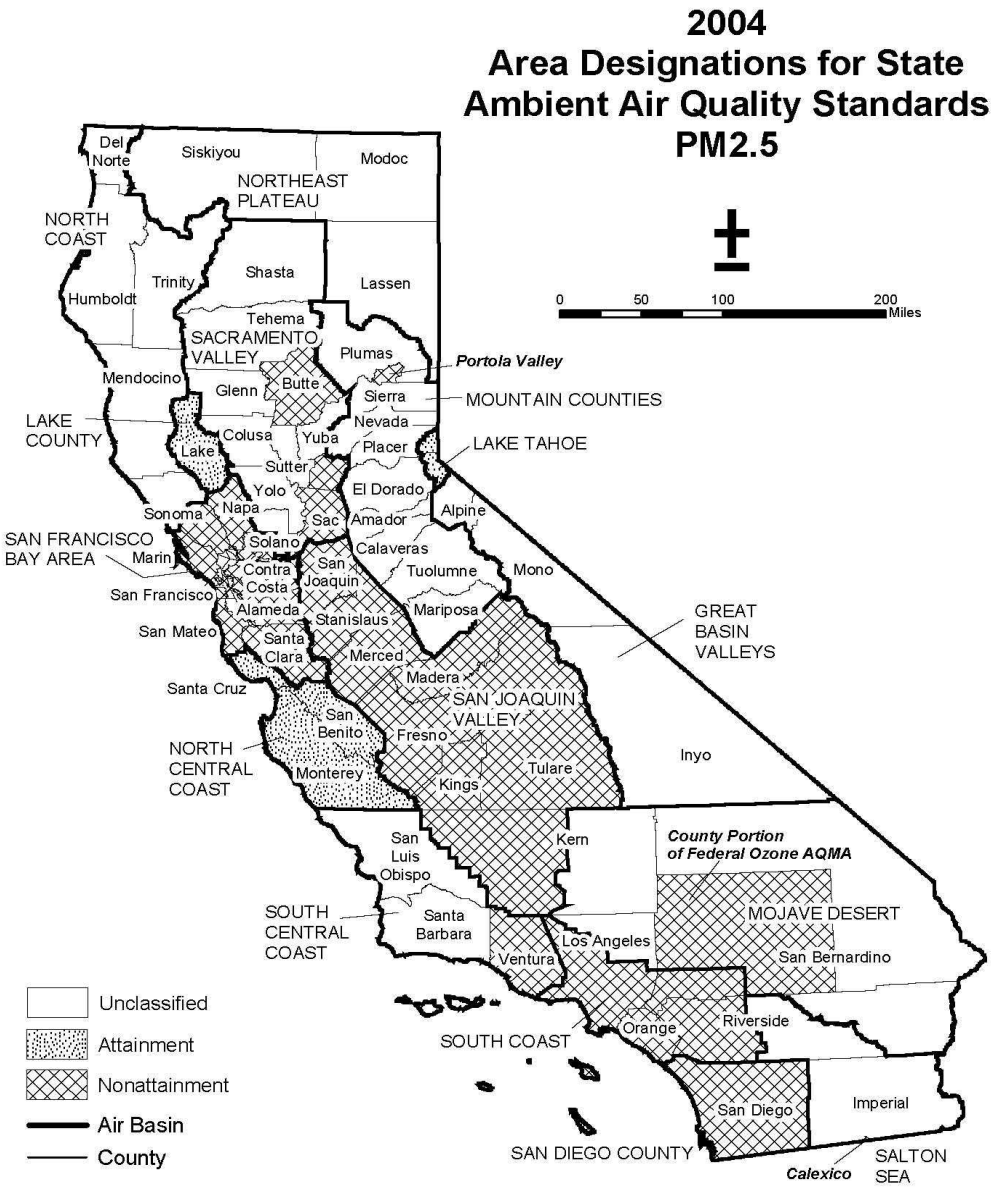
Figure IV-1



Source Date:
October 2003
Emission Inventory Branch, PTSD

October 18, 2004

Figure IV-2



Source Date:
October 2003
Emission Inventory Branch, PTSD

October 18, 2004

The local air districts in areas that are nonattainment for the State ozone standards are required by the CCAA to prepare plans. These plans must be designed to achieve and maintain the standards by the earliest practicable date. Each nonattainment district is also required to update its plan every three years to include the latest technical information, and any changes in demographics or other relevant information. In developing its plan, each district determines which measures are necessary to include, as well as the specific details of each included measure. In many of the nonattainment districts, substantial additional emission reductions will be necessary in order to achieve and maintain the State ozone standards.

The areas that are nonattainment for the State ozone standards are also nonattainment for the federal 8-hour ozone standard. New nonattainment designations include a number of rural Sierra foothill counties and additional parts of the Sacramento Valley. The federal one-hour standard was revoked on June 15, 2005, one year after the effective date of the designations. SIPs showing how each nonatttainment area will meet the eight-hour ozone 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 federal eight-hour ozone standard is more health-protective than the one-hour ozone standard, ARB expects that California will need to reduce emissions beyond the existing one-hour Ozone SIP targets.

Recent air quality trends have shown that progress is being made towards achieving clean air. In the South Coast Air Basin, the year 2005 was one of the cleanest air quality years on record, with the fewest days ever recorded for violations of the tough federal 8-hour ozone health standard. Air quality during this year's smog season exceeded the federal 8-hour ozone health standard on 84 days, compared to 90 days in 2004. The one-hour ozone average, no longer a regulatory standard but still an important air quality benchmark, was exceeded on 30 days in 2005, a slight increase from the 28 days of 2004 (SCAQMD, 2005). As shown in Figure IV-3, the smog trend in the South Coast Air Basin has been declining, as measured by the number of days over the federal one-hour ozone standard and the maximum one-hour ozone concentration.

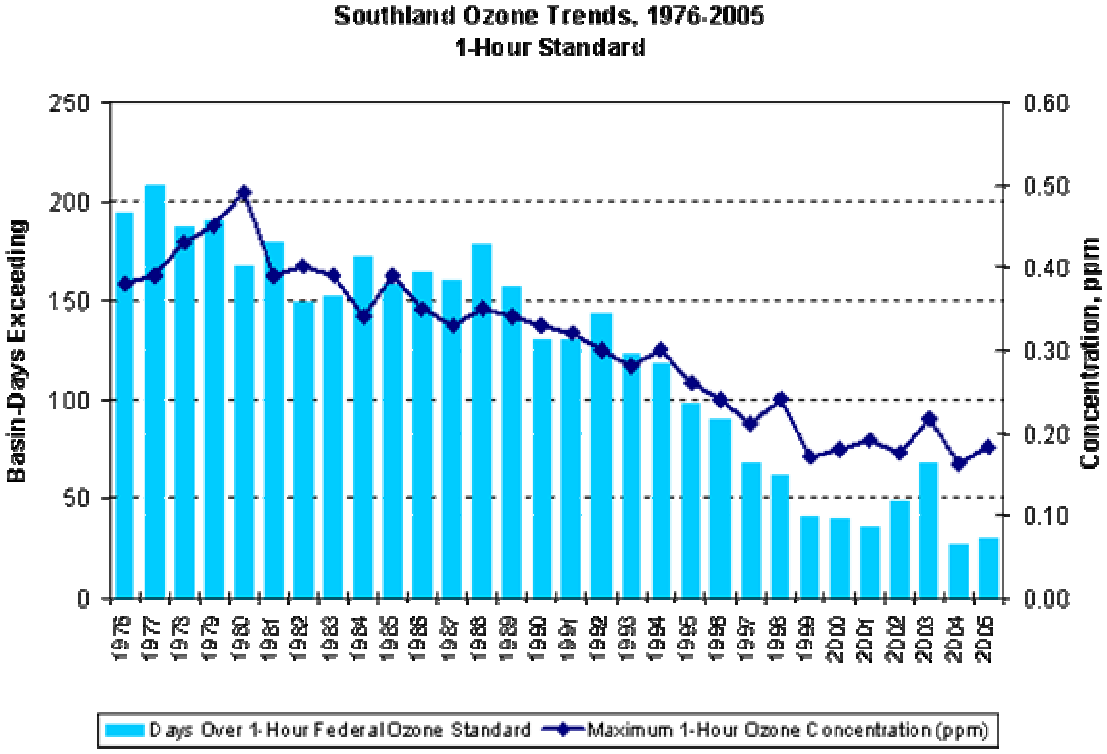
In the San Joaquin Valley Air Basin, the year 2005 was also one of the cleanest air quality years on record, with the fewest days ever recorded for violations of the tough federal 8-hour ozone health standard. Air quality during this year's smog season exceeded the federal 8-hour ozone health standard on 72 days, compared to 109 days in 2004. The one-hour ozone average, no longer a regulatory standard but still an important air quality benchmark, was exceeded on 8 days in 2005, a slight decrease from the 9 days of 2004 (ARB 2006 Almanac). As shown in Figure IV-4, the smog trend in the San Joaquin Valley Air Basin has been declining, as measured by the number of days over the federal one-hour ozone standard and the maximum one-hour ozone concentration.

Despite nearly 25 years of regulatory efforts and the decline of smog levels in areas such as the South Coast Air Basin and the San Joaquin Air Basin, ozone continues to be an important environmental and health concern in California and more

emission reductions are necessary. 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 current SIPs. More reductions will also be needed to satisfy the new eight-hour ozone standard.

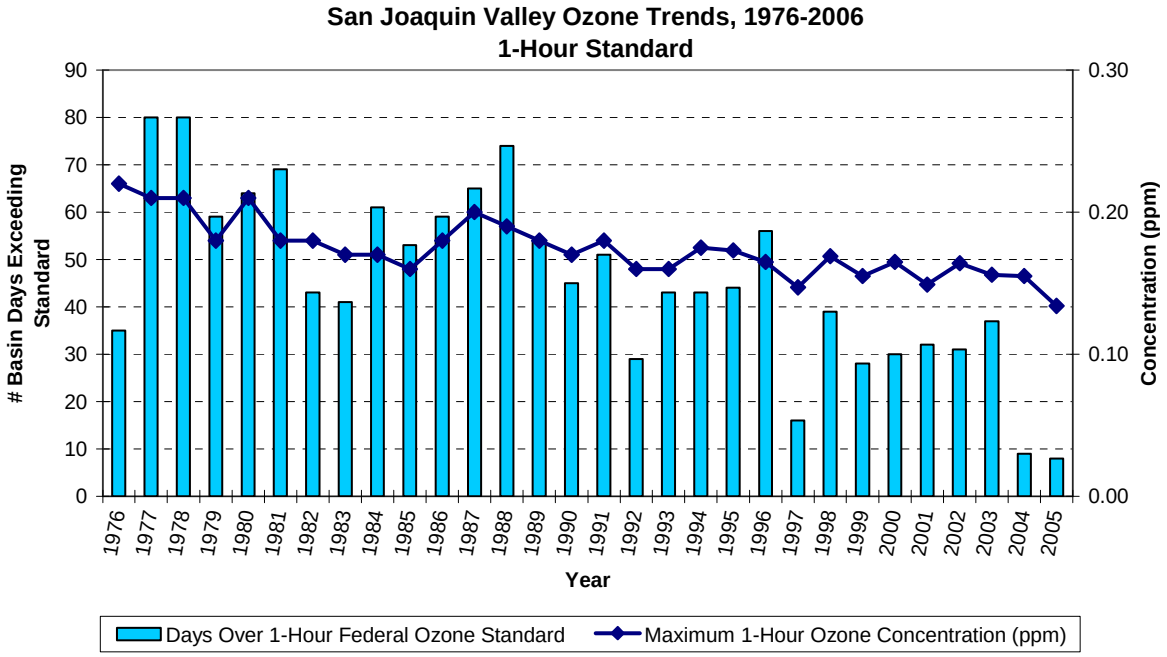
The important emission reductions that have been realized from the ARB's Consumer Products Program are expected to be partially offset by population growth, beginning in the year 2007. California's population is expected to grow to 40 million by 2010 (DOF, 2006). Therefore, ARB must continue its commitment to pursue additional technologically and commercially feasible reductions in consumer products emissions.

Figure IV-3
South Coast Air Basin Smog Trend



Source: South Coast Air Quality Management District, November 18, 2005 (SCAQMD, 2005).

Figure IV-4
San Joaquin Valley Air Basin Smog Trend



Source: ARB 2006 Almanac

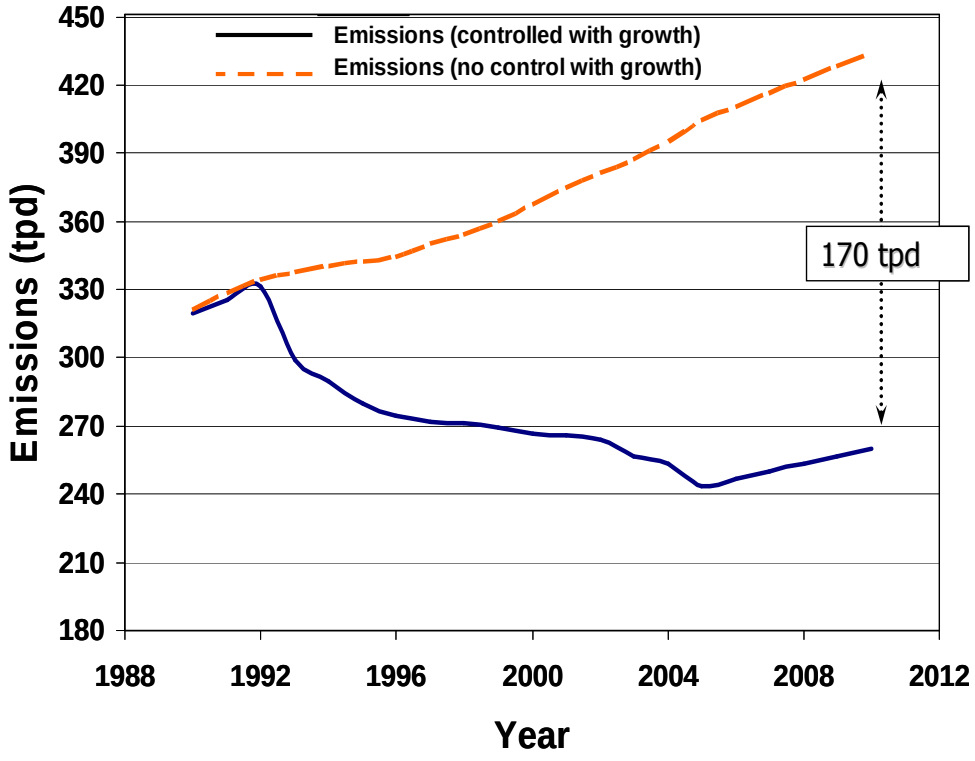
B. WHY REGULATE CONSUMER PRODUCTS?

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 37 million Californians (DOF, 2006) results in significant emissions. According the California Almanac of Emissions & Air Quality, 2006 Edition, consumer products accounted for 259 tpd of VOC emissions in the year 2005, which comprised over ten percent of the total VOC emissions statewide (ARB 2006 Almanac). VOC 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 2006. As a result of these measures, statewide consumer product VOC emissions have been reduced by over 170 tpd in 2010. Due to population growth, and without additional controls, staff expects the trend of emissions reductions to reverse once the currently adopted standards takes effect in 2006.

Figure IV-5
Consumer Products Emissions and Reductions 1990-2010



Source: ARB 2006 Almanac

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 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 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.

Airshed 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, 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.

In 1988, the CCAA was made law. 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 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, 145 VOC standards for 112 categories of consumer products (including antiperspirants and deodorants and aerosol coatings - 36 categories) have been established to meet the requirements of the Act.

The five regulations adopted to date will achieve over 40 percent reduction in overall VOC emissions from consumer products by the year 2008. Since significant further VOC reductions are necessary to attain the federal ozone standard, the reductions from the 2006 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 <u>both</u> the State and federal standards. The 2003 Statewide Strategy only addresses the ARB's commitments to achieve the federal 1-hour air quality standard for ozone. Both the federal eight-hour and the State standards are 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 section 41712 of the HSC.

On November 15, 1994, ARB adopted the California State Implementation Plan for Ozone (1994 SIP). The 1994 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 fulfilled by the Mid-term Measures I and 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 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)) (Settlement, 1999). 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 included 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 develop a measure by 2004, and implement 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 2006. The adopted 2004 Amendments to the Consumer Products Regulation fulfilled ARB's first settlement agreement relating to the consumer product category.

The second commitment in the settlement agreement was to propose to the ARB a measure to be implemented by 2008 that would achieve 4-8 tpd VOC emission reductions in the South Coast Air Basin. The 2006 Amendments proposed in this staff report fulfill the last of the consumer products related commitments in the SIP settlement agreement.

On October 23, 2003, ARB adopted the 2003 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. In the 2003 Statewide 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 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. This was achieved on June 24, 2004, when the Board adopted the 2004 Amendments to the Consumer Products Regulation.

- **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, which 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 2003 Statewide Strategy also set 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 (U.S. EPA, 2004a, 2004b). Significant reductions will be needed in both the South Coast Air Basin and the San Joaquin Valley Air Basin to meet the new standards.

The 2006 Amendments proposed in this staff report are intended to partially fulfill the commitment for SIP Measure CONS-2.

C. ESTIMATED EMISSIONS FROM CATEGORIES PROPOSED TO BE REGULATED

1. 2003 Consumer & Commercial Products Survey

The 2003 Consumer and Commercial Products Survey (2003 Survey) was mailed to over 3,000 companies in November 2004 (Appendix D). The 2003 Survey requested data on 250 categories of consumer products. Extensive outreach efforts were made to maximize the market coverage of the 2003 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 2003 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 2003 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 VOCs, LVP-VOCs, exempt compounds, or inorganic compounds. Prior to entry into the consumer products database, we made every effort to verify and correct the 2003 Survey data.

To further ensure the accuracy of the 2003 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 2003 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 915 companies responded to the 2003 Survey, reporting over 26,000 products sold in California. The 2003 VOC emissions from the consumer product categories surveyed are estimated to be about 160 tons per day, representing an estimated two-thirds of the total consumer products inventory, on an emissions basis.

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 (ARB, 1999). For categories where the coverage was determined to be low, adjustments were made by a variety of methods, including previous survey data, and estimates from industry publications, etc. This additional adjustment of 25 percent (indicating a 75 percent market coverage) was made in only one, Temporary Hair Color (aerosol), 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 (ARB, 1999). Staff worked with industry members during the development of the 2004 Amendments to determine the 2001 Survey coverage, and made adjustments to initially proposed market coverage factors (ARB, 2004).

Emission Estimates for Categories

The total emissions from the 15 categories proposed for regulation in the 2006 Amendments is estimated to be 26.2 tons per day in 2003. Table IV-2 summarizes these emissions.

Adequate Data

With our estimate of 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, and then put their own brand name on them. Those products generally employ the same technologies as other products made by manufacturers. Staff made extra effort to contact, work with, and obtain surveys from private labelers. We believe that this effort has improved the response from these responsible parties. Therefore, staff believes that because the 2003 Survey had excellent response from the primary manufacturers and good response from private labelers, and 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.

Table IV-2
VOC Emissions by Product Category

Product Category	Product Form	2003 VOC Emissions Adjusted* (Tons/Day)	2003 VOC Emissions Reductions* (Tons/Day)
Automotive Windshield Washer Fluid (Type "A" Areas)	All	1.70	0.31
Bathroom and Tile Cleaner	Non-aerosol	0.40	0.13
Brake Cleaner	All	4.84	3.70
Carburetor or Fuel-Injection Air Intake Cleaner	All	2.61	2.00
Construction, Panel and Floor Covering Adhesive	Non-aerosol	1.27	0.41
Disinfectant	Aerosol Non-aerosol	6.80 1.68	0.66 0.49
Engine Degreaser	Aerosol	1.05	0.62
Floor Polish or Wax: for resilient flooring material for nonresilient flooring material	 All All	 0.66 0.07	 0.43 0.05
Furniture Maintenance Product	Non-aerosol	0.17	0.06
General Purpose Cleaner	Aerosol	0.34	0.05
General Purpose Degreaser	Aerosol	0.98	0.70
Laundry Starch/Sizing/Fabric Finish Product	All	1.12	0.06
Oven Cleaner	Non-aerosol	0.30	0.09
Sanitizer	Aerosol Non-aerosol	1.41 0.47	0.46 0.33
Temporary Hair Color	Aerosol	0.30	0.13

* VOC emissions for each category have been adjusted for survey market coverage.
Source: 2003 Consumer and Commercial Products Survey (ARB, 2003).

REFERENCES

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

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

3. 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)

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

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

6. 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/ambient air qualitys/cambient air qualitys/ad-ambient air qualitys/ad-ambient air qualitys.htm. (ARB, 2000b)

7. 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/ambient air qualitys/std-rs/pm-final/pm-final.htm. (ARB, 2002)

8. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2003)

9. 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. May 7, 2004. (ARB, 2004)

10. Air Resources Board. Review of the California Ambient Air Quality Standard for Ozone, available at http://www.arb.ca.gov/research/ambient air qualitys/ozone-rs/rev-staff/rev-staff.htm. October 2005. (ARB, 2005)

11. Air Resources Board. The California Almanac of Emissions and Air Quality – 2006 Edition. 2006. (ARB 2006 Almanac)

12. Air Resources Board, Memorandum. Update to California Crop Loss Due to Ozone. From Stephen Shelby to Judy Yee. September 12, 2006. (ARB, 2006a)

13. Air Resources Board. Ambient Air Quality Standards. May 17, 2006. (ARB, 2006b)

14. Air Resources Board, Comparison of California's Ozone Problem to the Rest of the Country, July 29, 2006. (ARB, 2006c)

15. Department of Finance. Report: State Adds 444,000 in 2005: 2006 Population Nears 37.2 Million. May 1, 2006. (DOF, 2006)

16. 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)

17. Peters, John M., M.D., Sc.D. Prepared for the California Air Resources Board and the California Environmental Protection Agency, Epidemiologic Investigation to Identify Chromic Effects of Ambient Air Pollutants in Southern California, Contact No. 94-331, Children's Health Study, that was published on May 14, 2004. (CHS, 2004)

18. 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)), Final January 23, 1999; First Amendment to Settlement Agreement, December 9, 1999; Second Amendment, June 25, 2003. (Settlement, 1999)

19. 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)

20. South Coast Air Quality Management District. 2005 Southland Smog Season on of the Cleanest on Record. November 18, 2005. Webpage available at http://www.aqmd.gov/news1/2005/SmogSeason2005.htm. (SCAQMD, 2005)

21. United States Department of Agriculture. Agricultural Outlook: Statistical Indicators, Table 34.-Cash Receipts from Farm Marketing, by State (July 2006), available at http://www.ers.usda.gov/Publications/Agoutlook/AOTables/. (USDA, 2006)

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

23. United States Environmental Protection Agency. National Ambient Air Quality Standards for Ozone; Final Rule. Federal Register. July 18, 1997, Volume 62, Number 138, Page 38855-38896, available at http://www.epa.gov/fedrgstr/EPA-AIR/1997/July/Day-18/a18580.htm. (U.S. EPA, 1997a)

24. United States Environmental Protection Agency. National Ambient Air Quality Standards for Particulate Matter; Final Rule. Federal Register. July 18, 1997, Volume 62, Number 138, Page 38651-38701, available at http://www.epa.gov/fedrgstr/EPA-AIR/1997/July/Day-18/a18577a.htm. (U.S. EPA, 1997b)

25. 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)

26. United States Environmental Protection Agency. Air Quality Designations and Classifications for the Fine Particles (PM2.5) National Ambient Air Quality Standards. December 17, 2004. (U.S. EPA, 2004c)

27. United States Environmental Protection Agency. Review of the National Ambient Air Quality Standards for Ozone: Policy Assessment of Scientific and Technical Information OAQPS Staff Paper – Second Draft, July 2006, available at http://www.epa.gov/ttn/naaqs/standards/ozone/s_o3_cr_sp.html. (U.S. EPA, 2006a)

28. United States Environmental Protection Agency. National Ambient Air Quality Standards for Particulate Matter. September 21, 2006. (U.S. EPA, 2006b)

V.

PROPOSED AMENDMENTS TO THE CONSUMER PRODUCTS AND AEROSOL COATINGS REGULATIONS

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 2006 Amendments), the Regulation for Reducing the Ozone Formed from Aerosol Coating Product Emissions (the Aerosol Coatings Regulation), and explain the rationale for the amendments.

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 proposed Consumer Products and the Aerosol Coating Products Regulations can be found in Appendix B.

Amendments are being proposed to 7 Sections in the Consumer Products Regulation, Section 94508 "Definitions;" Section 94509 "Standards for Consumer Products;" Section 94510 "Exemptions;" Section 94511 "Innovative Products;" Section 94512 "Administrative Requirements;" Section 94513 "Reporting Requirements;" and Section 94515 "Test Methods." We are also proposing to amend Section 94523, "Exemptions," of the Aerosol Coating Products Regulation. These amendments are discussed below in detail. No other significant amendments to the existing Consumer Products Regulations are being proposed.

A few of the more significant existing regulatory provisions that will apply to the 2006 Amendment categories are described below. 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 Consumer Products Regulation

A. DEFINITIONS (SECTION 94508)

Section 94508, "Definitions," provides all the terms used in the Consumer Products Regulation which are not self-explanatory. The proposed amendments to the Regulation include new or revised definitions to help clarify and enforce the 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 definition changes, Section 94508(a) would also be reorganized to reflect proper alphabetical order. Please see Chapter VI, which contains a detailed discussion related to each newly proposed individually regulated category:

Table V-1
New Definitions Proposed for Addition

Sanitizer
Temporary Hair Color

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

All Other Forms
Anti-Static Product
Automotive Windshield Washer Fluids (Dilutable)
Automotive Windshield Washer Fluids (Pre-mixed)
Bathroom and Tile Cleaner
Brake Cleaner (formerly "Automotive Brake Cleaner")
Carburetor or Fuel-Injection Air Intake Cleaner
Construction, Panel, and Floor Covering Adhesive
Contact Adhesive
Disinfectant
Electronic Cleaner
Engine Degreaser
Existing Product
Fabric Protectant
Floor Polish or Wax
Furniture Maintenance Product
General Purpose Cleaner
Laundry Starch Product
Multi-purpose Solvent
Oven Cleaner
Paint Thinner
Rubber/Vinyl Protectant

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

<u>Electronic Cleaners</u>

In the 2004 Amendments to the Consumer Products Regulations, the Board approved a VOC limit of 75 percent by weight for "Electronic Cleaners." At the time the limit was approved, it was determined that the limit was commercially and technologically feasible. As is routinely done, before limits become effective, staff consults with stakeholders to ensure that the limits are technologically feasible. In 2005, several manufacturers indicated that they were encountering problems reformulating certain "Electronic Cleaners" to meet the 75 percent limit. These niche products are those that are used in manufacturing settings where products must be non-flammable, electrically non-conductive, have high dielectric strength, and have a high degree of solvency (Kauri-butanol (Kb) values of 45-55). Kb value is a measure of a compound's ability as a solvent. These attributes would be needed for cleaning

electronic components on a manufacturing line. Industry representatives also indicated that low-toxicity was important in this segment of the market.

Therefore, staff is proposing to exempt certain products from the definition and the 75 percent VOC limit. The label for these certain electronic cleaner products must clearly display the statement: "not for retail sale" and must be sold exclusively to establishments which manufacture or construct goods or commodities. This proposal should ensure that the full range of electronic cleaning products continue to be available to the California market. However, staff will continue to evaluate the need for the exemption as additional technology becomes available. Staff has also determined that approximately 31 of the 106 "Electronic Cleaners" reported in the 2001 Survey would meet the proposed exemption. This reduces the emission reductions claimed from the category in the 2004 Amendments by 0.13 tpd. This small shortfall will be offset by the emission reductions achieved through this rulemaking.

Multi-purpose Solvent

The regulation currently defines "Multi-purpose solvent" as "any organic liquid designed to be used for a variety of purposes, including cleaning or degreasing of a variety of substrates, or thinning, dispersing or dissolving other organic materials. "Multi-purpose Solvent" includes solvents used in institutional facilities, except for laboratory reagents used in analytical, educational, research, scientific or other laboratories. "Multi-purpose Solvent" does not include solvents used in cold cleaners, vapor degreasers, conveyorized degreasers or film cleaning machines, or solvents that are incorporated into, or used exclusively in the manufacture or construction of, the goods or commodities at the site of the establishment."

This definition was added to the Consumer Products Regulation during the Mid-Term Measures I rulemaking in order to clarify the definition for "Spot Remover." Though not explicitly discussed in the staff reports, the intent of this definition was to characterize those organic solvents that do not necessarily make specific use claims on the principal display panel, such as methyl ethyl ketone (or MEK), denatured alcohol, or mineral spirits. These products are sometimes referred to as "packaged solvents." However, this definition has been interpreted to include solvent-based consumer products that make multiple claims on the label. This is contrary to our original intent.

Examples of removal claims made by these multi-function products include: adhesives, candle wax, bugs, chewing gum, crayon, graffiti, paint, grease, lipstick, marker, oil, ink, scuff marks, and tar. Because many of these removal claims are consistent with those of regulated categories, in the 2004 Amendments, staff committed to analyze these types of products to develop an appropriate regulatory strategy.

In order to conduct this analysis, staff collected data via the 2003 Survey for such categories as "General Purpose Degreaser," "General Purpose Adhesive Removers," "Graffiti Removers," "Spot Removers," "Bug and Tar Removers," "Multi-purpose

Solvent," and "Paint Thinner," as well as undefined categories such as "clean-up solvent" and "lacquer thinner."

Because manufacturers were asked to choose only one primary survey category, multi-function products were reported in a variety of surveyed categories. Staff studied the label claims for the applicable categories and grouped the multi-function products for comparison. Commonly, the principal display panels of multi-function products make two or more removal claims, with additional removal claims listed on secondary display panels. These products are typically composed of approximately 60 percent VOC ingredients, although some products contain 20 percent or less VOC, while some contain nearly 100 percent VOC. Emissions from these products comprise approximately 1.5 tpd of VOC statewide, according to data collected from the 2003 Survey.

One goal of the Consumer Products program is to ensure products use the lowest amount of VOC commercially and technologically feasible. In our analysis of multi-function products, we found no significant differences between individual removal claims on multi-function products and corresponding label claims on single-claim products. The number of compliant products and complying market share within categories with established VOC limits indicate that the current limits are technologically and commercially feasible. Therefore, staff concludes that no special exception in VOC content needs to be made for products that make several claims versus those that make single claims.

To level the playing field, ensure that claimed emissions reductions are achieved, and clarify the intent of the Multi-purpose Solvent definition, staff is proposing to change the definition to read: any liquid product designed to be used for dispersing or dissolving or removing contaminants or other organic materials. "Multi-purpose Solvent" includes (A) products that do not display specific use instructions on the product container or packaging, (B) products that do not specify an end-use function or application on the product container or packaging, and (C) solvents used in institutional facilities, except laboratory reagents used in analytical, educational, research, scientific, or other laboratories. "Multi-purpose Solvent" does not include solvents used in cold cleaners, vapor degreasers, conveyorized degreasers or film cleaning machines, or solvents that are incorporated into, or used exclusively in the manufacture or construction of, the goods or commodities at the site of the establishment. "Multi-purpose Solvent" also does not include any product making any representation that the product may be used as, or is suitable for use as a consumer product which qualifies under a definition in section 94509(a); such products are not multipurpose solvents and are subject to the "Most Restrictive Limit" provision of section 94512.

The proposed amended definition would include products without specific label claims or specific end-use functions and explicitly includes packaged solvents that are presently marketed without specific label claims. That means, for example, a product labeled only as xylenes, without a specific function or use would be considered a Mult-purpose Solvent. Xylenes labeled as "Paint Thinner" would also not be considered

a Multi-purpose Solvent because the regulation does not include a standard for this category in section 94509. This would also mean that any product that makes claims which qualify the product under a definition in the regulation anywhere on the label, would no longer fit the Multi-purpose Solvent definition. The proposed amended definition still excludes laboratory reagents, solvents used in district-regulated cleaning/degreasing operations, and solvents used exclusively on-site in the manufacture or construction of goods or commodities.

The proposed amended definition will also assist in determining product compliance under the most restrictive limit provision of the regulation.

Staff intends to propose a regulatory standard for Multi-purpose Solvent products in the 2007 rulemaking. While it is not immediately necessary for manufacturers to reformulate or relabel their products, this proposed definition change is intended to clarify the types of products that would be subject to further regulatory action. Staff anticipates that these changes will clarify intent, could achieve significant emission reductions by encouraging consumers to use lower VOC products for specific removal functions, and preserve emissions reductions already claimed.

As part of the multi-function product analysis, staff specifically committed to re-analyze the commercial and technological feasibility of limits for general purpose adhesive remover and graffiti remover proposed in the 2004 amendments. The 2003 survey data support the commercial and technological feasibility claims for limits approved in the 2004 Amendments, as shown in Table V-3. In reviewing the data for the 2003 Survey, reported general purpose adhesive remover and graffiti remover products were categorized as such based on primary label claims. Products for which general purpose adhesive remover and graffiti remover are among multiple primary claims (such as some multi-function products) were not included in this analysis, but could be subject to those limits under the most restrictive limit clause and could therefore influence the figures for the 2003 data in Table V-3 below. Regardless, the types and number of reported products, as well as the complying market share and number of complying products, indicate the limits are achievable as adopted.

Table V-3
Comparison of 2001 Survey Data with 2003 Survey Data

Category	Number of Products/Product Groups		Complying Products/Product Groups		Complying Market Share (%)	
	2001	2003	2001	2003	2001	2003
General Purpose Adhesive Remover	43	57	9	10	42	9
Aerosol Graffiti Remover	35	48	3	9	39	25
Non-aerosol Graffiti Remover	30	45	4	15	11	13

Staff will also contact the manufacturers of the products that do not currently meet the limits for the above listed categories to identify any reformulation issues.

Issues:

1. Issue: Some paint thinners make other claims such as project clean-up, degreasing or adhesive removal.

Response: Any product, including paint thinner, must meet the lowest regulated VOC limit according to claims made anywhere on the label, as outlined in the most restrictive limit provision that becomes effective, January 1, 2007. However, unregulated claims, such as chewing gum removal or brush cleaning, can still be made on the label, making it a Multi-purpose solvent. Changes to the "Multi-purpose Solvent" definition are intended to encompass those products with no claims, or label claims that do not fall within a defined category.

2. Issue: There is no utility in requiring that manufacturers relabel paint thinners. There is no emissions benefit.

Response: Paint Thinners are not currently regulated, therefore, re-labeling isn't immediately necessary unless the product makes other claims on the label that qualify the product under a regulation definition that has an associated VOC limit. However, we intend to evaluate the feasibility of setting an emission standard for Multi-purpose Solvent for the March 2007 Amendments. If an emission standard were to be adopted, then a Paint Thinner manufacturer may choose to label the product consistent with the regulatory definition at the time the Multi-purpose Solvent limit became effective.

Nail Polish Remover

The Nail Polish Remover (NPR) category consists of products which are designed and labeled primarily for the purpose of removing nail polish or other nail coatings from the surface of fingernails and toenails. These products generally consist of a solvent or mixture of solvents which act to dissolve the nitrocellulose present in nail polish. Depending upon formulation, nail polish removers may have a secondary function of removing artificial nails, wraps, and tips. Nail Polish Removers were first regulated under "Phase I" of the Consumer Products Regulation adopted in October of 1990.

Under "Midterm II" of the Consumer Products Regulation adopted in October of 1999, a VOC limit of zero percent by weight for NPR became effective in December 2004. Many existing formulations that are compliant with this standard are comprised of acetone, an exempt solvent. Yet, a significant market exists for non-acetone products because acetone may damage artificial nails. The traditional solvent for non-acetone formulations is ethyl acetate, a VOC.

In order to meet the NPR VOC standard, as well as market demand, some manufacturers attempted to reformulate using the exempt solvent methyl acetate. Methyl acetate was suggested as a possible non-acetone reformulation option in the Initial Statement of Reasons in the Midterm II regulatory amendments when the zero percent standard was originally adopted. In October 2004, two major NPR manufacturers approached staff to discuss difficulties they had encountered with reformulated non-acetone based NPR products. The manufacturers encountered two issues resulting from the use of methyl acetate. First, a small amount of VOC impurities exist in the raw materials, up to 0.5 percent, even in the purest grade of methyl acetate. Second, methyl acetate, when in contact with water, undergoes a chemical reaction that yields methanol and acetic acid (both VOCs) as products, which continues even after the product is packaged. Over the course of conducting accelerated aging and stability testing of new formulations, the manufacturers discovered the reaction occurs at various compositions of methyl acetate, even with additives to minimize the reaction (such as pH buffers). They estimate the reaction can form approximately one percent VOC within one year after manufacture. With the adopted limit of zero percent VOC in place, these methyl acetate-based NPR products could conceivably be subject to enforcement action, despite being formulated and manufactured in good faith and distributed in a timely fashion.

To accommodate these unavoidable circumstances, staff proposes raising the NPR VOC limit to one percent by weight, to become effective December 31, 2007. Manufacturers have indicated that a one percent VOC level is achievable by using high-grade methyl acetate (which contains the lowest levels of methanol contamination) and the inclusion of additives to minimize VOC formation over time. Raising the limit amounts to an emission reduction shortfall of 0.04 ton per day, which will be offset by emission reductions resulting from the current regulatory amendments.

Rubber and Vinyl Protectant

Background

ARB staff is proposing definition changes pertaining to the current “Rubber and Vinyl Protectant” and “Fabric Protectant” categories. There is no proposal at the present time to change the VOC limit for either category. However, staff may consider a revision of the VOC limit for “Fabric Protectants” as part of the March 2007 amendments. At the present time, ARB staff is also proposing related changes to the exemptions in the Aerosol Coatings Regulation. We believe that the proposed modifications, as discussed below, are needed to clarify the regulations, to preserve emission reductions claimed in past rulemakings, and to maintain a level playing field for those products that sometime ago reformulated to meet certain VOC limits. The proposed definition changes would become effective December 31, 2008.

For “Rubber and Vinyl Protectants,” the consumer products survey for calendar year 2003 had required reporting only for the non-aerosol products. Reporting for the aerosol products was deferred to the next regulatory cycle (for calendar year 2005 or

2006), anticipated to begin toward the end of 2006. However, staff decided to move the definition change proposal (applicable to all product forms) forward and added it to the current proposal package to expedite urgently needed clarifications. To accomplish this, during summer 2006, staff requested marketers to early-submit survey data for aerosol products for sales year 2005. The 2005 survey data provided information toward developing the current definition change proposal. Since the aerosol products had been scheduled for review during the next regulatory cycle (after the March 2007 amendments), staff may at that time consider changes to the VOC limit for the aerosol products.

"Rubber and Vinyl Protectants" are products used to protect, preserve, or renew vinyl, rubber, and plastic on vehicles, tires, luggage, furniture, and other household items. The category includes tire cleaners that leave an appearance-enhancing or protective substance on the tire, but does not include other tire cleaners. Typical products include tire shine, protectants for automotive interior plastic and vinyl, and protectants for exterior automotive rubber/plastic bumpers and trim. The "Rubber and Vinyl Protectant" category does not include products primarily used to clean the wheel rim, such as aluminum or magnesium wheel cleaners.

"Rubber and Vinyl Protectant" products were regulated under "Mid-term Measures I" of the Consumer Products Regulation adopted July 24, 1997, and a description of those products is included in the staff report for that item (ARB, 1997). At that time, the Board adopted a 10 percent VOC limit for aerosol products, effective January 1, 2005, and a 3 percent VOC limit for non-aerosol products, effective January 1, 2003.

"Fabric Protectants" were regulated under "Phase II" of the Consumer Products Regulation adopted January 1992, and a description of those products is included in the staff report for that item (ARB, 1991b). At that time, the Board adopted as staff had recommended, a 75 percent VOC limit for all product forms effective January 1, 1995, along with a 60 percent VOC limit for all product forms subsequently effective January 1, 1997. The 60 percent VOC limit remains effective to this day. As indicated above, staff may propose a revision to the "Fabric Protectant" VOC limit, as part of the March 2007 amendments.

Overlap Between Consumer Products Regulation and Aerosol Coatings Regulation

Historically, "Rubber and Vinyl Protectants" and "Fabric Protectants" have been specifically regulated within the "Consumer Products Regulation." However with many products, there is a regulatory overlap with certain requirements in the Aerosol Coatings Regulation, which is primarily applicable to aerosol spray paint. The Aerosol Coatings Regulation includes a category of "vinyl/fabric/leather/polycarbonate coatings." This category applies to aerosol coating products used for certain plastic substrates (vinyl or polycarbonate), or for fabric substrates. The current regulatory standard for "vinyl/fabric/leather/polycarbonate coatings" is 1.55 PWMIR (product-weighted

maximum incremental reactivity), effective January 1, 2003. The Aerosol Coatings Regulation was not designed or developed with the intention of regulating "Rubber and Vinyl Protectants" or for "Fabric Protectants."

The Aerosol Coatings Regulation defines "Aerosol Coating Product" to mean "a pressurized coating product containing pigments or resins that dispenses product ingredients by means of a propellant, and is packaged in a disposable can for hand-held application ... " This definition may be interpreted to include many of the "Rubber and Vinyl Protectant" and "Fabric Protectant" products, since they protect substrates by leaving a film (i.e. coating) on the surface, and the products are applied by hand-held aerosol spray containers that are disposable. With the regulatory overlap, there is confusion concerning which regulation (or both) applies.

To avoid the overlap and the two sets of compliance requirements for industry, ARB staff is proposing changes in the two regulations to clarify that certain overlap products are regulated solely within the Consumer Products Regulation, as presently considered by ARB staff and most product marketers, while other products are regulated solely within the Aerosol Coatings Regulation. To accomplish this, products that meet either the proposed "Rubber/Vinyl Protectant" definition or the proposed "Fabric Protectant" definition in the Consumer Products Regulation would be regulated as such, and would be explicitly excluded from the Aerosol Coatings Regulation.

In addition, to clarify that cosmetics and other products used on the human body are also regulated solely within the Consumer Products Regulation, as presently considered by ARB staff and most product marketers, those products would also be explicitly excluded from the Aerosol Coatings Regulation. Likewise, this clarification would pertain to personal care aerosol products containing pigment or resin, and dispensed by hand-held disposable containers.

Any Combination of Substrates

While the definition used the word "and" in "Rubber and Vinyl Protectant," ARB staff had always considered this to mean "and/or" rubber/vinyl, and that the category included products for: 1) both "rubber and vinyl," 2) for "rubber only," and 3) for "vinyl only." Because of the definition drafting error, it was unclear that products such as tire protectants which only protected rubber surfaces, rather than rubber and vinyl surfaces, qualify as "Rubber and Vinyl Protectants." Also, the definition had always included products used to protect plastic substrates (e.g. hard plastics), although the category name was simply "Rubber and Vinyl Protectant." When considering what products are included in the category, we believe that most marketers had been consistent with the ARB staff interpretation. With increasing market competition products such as "tire shine" used for rubber only, the "and/or" issue has become problematic. To clarify the definition, ARB staff is proposing revisions using the word "or," and using the slash "/."

Proposed Definition Changes

The propose changes are shown below.

Consumer Products Regulation, section 94508. Definitions

(1213) "Rubber and /Vinyl Protectant" means:

(A) for products manufactured before December 31, 2008: any product designed to protect, preserve or renew vinyl, rubber, and plastic on vehicles, tires, luggage, furniture, and household products such as vinyl covers, clothing, and accessories. "Rubber and /Vinyl Protectant" does not include products primarily designed to clean the wheel rim, such as aluminum or magnesium wheel cleaners, and tire cleaners that do not leave an appearance-enhancing or protective substance on the tire.

(B) for products manufactured on or after December 31, 2008: any product designed or labeled to protect, preserve or renew vinyl, or rubber on vehicles, tires, luggage, furniture, and/or household products such as vinyl covers, clothing, or accessories. "Rubber/Vinyl Protectant" does not include: products primarily labeled to clean the wheel rim, such as aluminum or magnesium wheel cleaners; tire cleaners that do not leave an appearance-enhancing or protective substance on the tire; pigmented products used primarily for coloring; translucent-film-forming products used in conjunction with pigmented products; and other film-forming products used for construction, reconstruction, modification, structural maintenance or repair of rubber or vinyl substrates, or products qualifying as Vinyl/Fabric/Leather/Polycarbonate Coating under section 94521(a).

(51) "Fabric Protectant" means:

(A) for products manufactured before December 31, 2008: a product designed to be applied to fabric substrates to protect the surface from soiling from dirt and other impurities or to reduce absorption of liquid into the fabric's fibers. "Fabric Protectant" does not include waterproofers, products designed for use solely on leather, or products designed for use solely on fabrics which are labeled "for dry clean only" and sold in containers of 10 fluid ounces or less.

(B) for products manufactured on or after December 31, 2008: a product designed or labeled to be applied to fabric substrates to protect the surface from soiling from dirt or other impurities or to reduce absorption of liquid into the fabric's fibers. "Fabric Protectant" does not include waterproofers or products designed for use solely on leather. Fabric

Protectant" does not include pigmented products used primarily for coloring, translucent-film-forming products used in conjunction with pigmented products, and other film forming products used for construction, reconstruction, modification, structural maintenance or repair of fabric substrates, or products qualifying as Vinyl/Fabric/Leather/Polycarbonate Coating under section 94521(a).

Aerosol Coatings Regulation, section 94523. Exemptions

a) i) for products manufactured before December 31, 2008: This article shall not apply to aerosol lubricants, mold releases, automotive underbody coatings, electrical coatings, cleaners, belt dressings, anti-static sprays, layout fluids and removers, adhesives, maskants, rust converters, dyes, inks, cosmetics or any other products used on the human body, and leather preservatives or cleaners.

ii) for products manufactured on or after December 31, 2008: This article shall not apply to aerosol lubricants, mold releases, automotive underbody coatings, electrical coatings, cleaners, belt dressings, anti-static sprays, layout fluids and removers, adhesives, maskants, rust converters, dyes, inks, cosmetics or any other products used on the human body, leather preservatives or cleaners, "Rubber/Vinyl Protectants" as defined in section 94508, and "Fabric Protectants" as defined in section 94508.

Effect of Proposed Definition Changes

The proposed definitions for "Rubber/Vinyl Protectant" and "Fabric Protectant" each includes a proposed exclusion for "Vinyl/Fabric/Leather/Polycarbonate Coating" products. However, the definition of "Vinyl/Fabric/Leather/Polycarbonate Coating" specifies that a coating must be exclusively for these substrates to qualify as an excluded product. For example, if a product is labeled for vinyl and fabric substrates only, it would qualify as a "Vinyl/Fabric/Leather/Polycarbonate Coating" and is thus excluded from the "Rubber/Vinyl Protectant" category and thus also excluded from the "Fabric Protectant" category. However, if a product is labeled for any other non-specified substrate (e.g. for rubber or for plastic-- which includes hard plastic and non-vinyl plastic other than polycarbonate), that would make the product ineligible as "Vinyl/Fabric/Leather/Polycarbonate Coating." Therefore, such a product for rubber, would be a "Rubber/Vinyl Protectant" if it meets the remainder of the "Rubber/Vinyl Protectant" definition. Such a product for fabric would be a "Fabric Protectant" if it meets the remainder of the "Fabric Protectant" definition.

Tire protectant/coating/shine products (i.e. for rubber) (other than products that are solely tire cleaners) would be “Rubber/Vinyl Protectant.”

All products for “vinyl” (e.g. for car interiors) would be “Rubber/Vinyl Protectant.” The word “plastic” would make these products ineligible for the “Vinyl/Fabric/Leather/Polycarbonate Coating” exclusion, and therefore they would be in the category “Rubber/Vinyl Protectant.”

An aerosol coating (either clear or pigmented) for rubber and vinyl, which is currently considered a “clear coating,” a “nonflat coating,” or a “flat coating,” (not qualifying as “Vinyl/Fabric/Leather/Polycarbonate Coating” because of other substrates such as rubber, metal, wood), would be subject to the “Rubber/Vinyl Protectant” limit in the Consumer Products Regulation. These products may avoid this overlap by removing the word, “rubber,” from the label.

A product for protecting fabric that may be labeled for vinyl/leather/polycarbonate as well would be excluded from the “Fabric Protectant” category. These products would be “Vinyl/Fabric/Leather/Polycarbonate Coating” products in the Aerosol Coatings Regulation.

Issues:

1. Issue: Products continually change, sometimes innovatively, to meet consumer preference. The regulatory language needs to clearly place a product into either the Consumer Products Regulation or the Aerosol Coatings Regulation. The Rubber/Vinyl Protectants have changed substantially. There are now more products with multiple claims for cleaning, shining, and protecting. Also, some “tire dressings” have evolved into longer-durability “tire coatings,” which are more appropriately classified under the aerosol coatings regulation. There should not be any most-restrictive-limit requirement between the consumer products and aerosol coating regulations.

Response: Where there is confusion, we are proposing to clarify that certain affected products are regulated by the Consumer Products Regulation and others by the Aerosol Coatings Regulation. With this clarification, there will not be a most restrictive limit issue. We understand that products are improved over time, and some are now more durable than in the past. However, in the case of tire dressings or coatings we believe that the Consumer Products Regulation is still the more pertinent regulation for most affected products. These products were clearly intended to be regulated in the Rubber and Vinyl Protectant category of the Consumer Products Regulation as demonstrated in the staff report done for the initial rulemaking.

2. Issue: Any proposed definition should not include additional products. If the compliance status of current products is to be affected, sufficient data should exist to determine the feasibility and impacts of regulatory change.

Response: The proposed definitions should not include additional products, although there may be questions about which regulation had applied to particular products. We expect that feasibility and impacts of the regulatory change are not substantial issues. We will work with industry on a case-by-case basis to resolve specific compliance issues.

3. Issue: Industry would accept an ARB determination that aerosol rubber/vinyl protectant should be subject to limits in the Aerosol Coatings Regulation. Time may be needed to allow companies to assure compliance with appropriate formulations and labels. We are also willing to similarly consider fabric protectants. However, no consumer product should be subject to both regulations and the most-restrictive limit. The two regulations should be mutually exclusive regarding which one applies to a particular product.

Response: See responses to 1 and 2 above. Regarding compliance with appropriate formulations and labels, we will work with industry on a case-by-case basis to identify and resolve specific issues.

4. Issue: Some specialty coatings (aerosol paint products) are used for repair of automotive interior parts with vinyl and plastic surfaces. The word "coat" would eliminate these products, since they would not be able to comply with the VOC limits. The word "coat" should be removed.

Response: We have deleted the word "coat," and have added other changes to address this issue in the proposed definitions above. Products used solely for vinyl would be in the Aerosol Coatings Regulation. Products used for both vinyl and plastic, and for rubber, vinyl, and plastic would be subject to the Consumer Products Regulation.

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 three new categories, and by adding more stringent VOC limits for 12 existing categories. The new or modified VOC limits would become effective on either December 31, 2008 or December 31, 2010, as indicated in Table V-5 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
Automotive Windshield Washer Fluid (Type "A" Areas)	All	25	12/31/08
Bathroom and Tile Cleaner	Non-aerosol	1	12/31/08
Brake Cleaner	All	10	12/31/08
Carburetor or Fuel-Injection Air Intake Cleaner	All	10	12/31/08
Construction, Panel, and Floor Covering Adhesive	All	7	12/31/08
Disinfectant	Aerosol	70	12/31/08
	Non-aerosol	1	12/31/08
Engine Degreaser	Aerosol	10	12/31/08
Floor Polish or Wax (for resilient flooring material)	All	1	12/31/10
Floor Polish or Wax (for nonresilient flooring material)	All	1	12/31/10
Furniture Maintenance Product	Non-aerosol	3	12/31/08
General Purpose Cleaner	Aerosol	8	12/31/08
General Purpose Degreaser	Aerosol	10	12/31/08
Laundry Starch/Sizing/Fabric Finish Product	All	4.5	12/31/08
Oven Cleaner	Non-aerosol	1	12/31/08
Sanitizer	Aerosol	70	12/31/08
	Non-aerosol	1	12/31/08
Temporary Hair Color	Aerosol	55	12/31/10

Other Sections of 94509

Prohibition of Toxics from Specific Categories

We are proposing to prohibit the use of methylene chloride, perchloroethylene and trichloroethylene in "Construction, Panel, and Floor Covering Adhesive," "Oven Cleaners," "General Purpose Cleaners," and "Bathroom and Tile Cleaners." The 2003 Survey found a "Construction, Panel and Floor Covering Adhesive" product containing methylene chloride. However, it is our understanding the product has been discontinued. In addition, an oven and grill cleaning product, closely related to, but not included in the oven cleaner category, was found to also contain methylene chloride. It

is also possible that chlorinated solvents could be included in reformulated “General Purpose Cleaners” and “Bathroom and Tile Cleaners.”

Under the California Environmental Quality Act, ARB is required to identify and mitigate any possible adverse environmental impacts of regulatory actions. We believe that it is unlikely, but possible, that manufacturers may, in response to new VOC limits, choose to reformulate with chlorinated solvents in these categories. Therefore, because there are many products that comply with the proposed limits, none of which contain chlorinated solvents, we thought it prudent to prohibit their use.

Proposed Amendments to the Aerosol Coatings Regulation

A. EXEMPTIONS (SECTION 94523)

To avoid overlap, and two sets of compliance requirements for industry, ARB staff is proposing changes in the Aerosol Coatings Regulation to clarify that certain products are regulated solely within the Consumer Products Regulation, as presently considered by ARB staff and most product marketers. To accomplish this, products that meet either the proposed “Rubber/Vinyl Protectant” definition or the “Fabric Protectant” definition in the Consumer Products Regulation would be regulated as such, and would be explicitly excluded from the Aerosol Coatings Regulation.

In addition, to clarify that cosmetics and other products used on the human body are also regulated solely within the Consumer Products Regulation, as presently considered by ARB staff and most product marketers, those products would also be explicitly excluded from the Aerosol Coatings Regulation. Likewise, this clarification would pertain to personal care aerosol products containing pigment or resin, and dispensed by hand-held disposable containers.

REFERENCES

1. 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)

2. 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)

3. 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)

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

VI.

DESCRIPTION OF PRODUCT CATEGORIES

A. Automotive Windshield Washer Fluid (Type "A" Areas)

Product Category Description:

Automotive windshield washer fluids are liquids designed or labeled for use in motor vehicle windshield washer fluid systems either as an anti-freeze or for the purpose of cleaning, washing, bug removal, or wetting the windshield**.** Some products also claim to add a coating to the windshield that repels water, bugs, dirt, and grime. "Automotive Windshield Washer Fluid" does not include any fluid which is placed in the windshield washer reservoir of new motor vehicles at the time the vehicle is manufactured. Dilutable automotive windshield washer fluids are sold either in a container with a capacity of 55 gallons or more or a container with a capacity of one quart or less. Pre-mixed automotive windshield washer fluids are sold in a container with a capacity that is greater than one quart but less than 55 gallons.

Automotive windshield washer fluids are sold as both ready-to-use (pre-mixed) products and dilutable concentrates (dilutables). The pre-mixed products make up the vast majority of the market and are generally sold in one gallon jugs. Pre-mixed products, are intended to be poured directly into the fluid reservoir without any additional dilution or mixing. On the other hand, dilutable concentrates allow consumers to mix the concentrated windshield washer fluid with water to the specified concentration in a separate container or the washer fluid reservoir. These dilutable products are generally sold in sizes of one quart or less, although a few dilutable products are currently sold in half or one gallon containers**.**

Automotive windshield washer fluids are regulated based on the areas of California they would be used in: Type "A" areas and all other areas. Type "A" areas are regions of the State which experience colder temperatures and require a higher VOC content to prevent freezing of the fluid in the washer fluid reservoir. Specifically, Type "A" areas include only the following regions of California: Del Norte, Shasta and Trinity Counties; the Great Basin Valley, Lake Tahoe, Mountain Counties, and Northeast Plateau Air Basins, as defined in title 17, California Code of Regulations, sections 60105, 60108, 60111, and 60113.

Automotive windshield washer fluids (Type "A" areas) were regulated under "Phase I" of the consumer products regulation adopted in October of 1990, and a description of these products is also included in the staff report for that item (ARB, 1990). At that time, the Board adopted a 35 percent VOC limit for these products which was effective on January 1, 1993.

Table VI-1 below summarizes the sales and emissions from automotive windshield washer fluids in Type "A" areas based on the results of the ARB's 2003 Consumer and Commercial Products Survey (ARB, 2003). As shown in Table VI-1, 38 Automotive Windshield Washer Fluids (Type "A" areas) were reported in the survey with estimated VOC emissions of about 1.68 tpd (3,352 pounds per day) in California.

Table VI-1
Automotive Windshield Washer Fluids (Type "A" Areas)*

Product Form	Number of Products	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
All forms	38	10,982	3,352

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

Product Use and Marketing:

Automotive windshield washer fluids can be split into two fluid types: Generic "blue fluid" with limited freeze protection and De-Icer fluids, which are necessary in areas that require freeze protection. Type "A" areas require De-Icer fluids. De-Icer fluids perform 3 functions: maintenance of adequate freeze protection in the vehicle reservoirs and fluid lines, melt and remove ice, frost and snow from windshields on initial startup, and elimination of ice and snow buildup and maintenance of visibility while driving. Data show that certain areas of California can get as low as -32 degrees Fahrenheit in January very often (Honeywell CPG-Prestone, 2006). Although temperatures are unlikely to get that low, it is important that products are available in these areas to provide the necessary amount of freeze protection.

Automotive windshield washer fluids (Type "A" areas) are sold in auto parts stores, gas stations, car dealerships, hardware stores, grocery supermarkets, convenience stores and in mass-merchandisers. Automotive windshield washer fluids are periodically added to the vehicle reservoir by the "do-it-yourself" customer or by a technician at an automotive repair facility, as needed. A small pump moves the fluid through tubing until it is squirted onto the windshield(s) through orifices at the base of the front windshield and the top of the rear windshield (if applicable). Automotive windshield washer fluid can also be routed through separate tubing and sprayed onto the headlights of some newer vehicles to remove dirt and insects from the headlight lenses.

Requiring the physical "squeegee" action of the wiper blades, automotive windshield washer fluids remove ice, dirt, bugs, dust and other contaminants from the windshield. Drivers typically squirt these products onto their vehicle windshield when they first start the vehicle to remove ice or accumulated dust. They may also be applied while driving to remove bugs or other contaminants that contact the windshield when the vehicle is moving.

Product Formulation:

Automotive windshield washer fluids (Type A areas) are composed of water and a mixture of VOC and LVP-VOC ingredients, as well as inorganics, with the VOCs composed mainly of alcohols and glycol ethers. The VOCs in windshield washer fluids serve several purposes. First, in Type A areas, the VOCs typically serve as freeze-point depressors. VOCs can also serve as growth inhibitors, which is an important function for preventing mold and algae growth in the reservoir and tubing of the windshield washer system. However, several glycol ethers would serve this same function and several would qualify as exempt LVP-VOCs.

Proposed VOC Limit and Compliance:

The proposed VOC limit for Automotive Windshield Washer Fluid (Type A areas), is 25 percent by weight, effective December 31, 2008. As shown in Table VI-2, using adjusted 2003 emissions, the proposed limit will result in an estimated emission reduction of 620 pounds per day or 0.31 tons per day.

Table VI-2 also shows that 12 products, representing 17 percent of the market currently comply with the proposed 25 percent by weight VOC limit.

Table VI-2
Automotive Windshield Washer Fluid (Type A Areas) Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	Emissions Reductions (lbs/day)**
All forms	25	12	17	620

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

Manufacturers should be able to meet the proposed 25 percent VOC limit by reformulating their existing product with LVP-VOC and inorganic substitutes. This limit allows for products to maintain both their freeze-point stability and overall product effectiveness. As an example, manufacturers may meet the proposed limit by replacing the level of alcohol with more water or LVP-VOC glycol ethers.

Issue:

1. Issue: The proposed VOC limit of 25 percent for Automotive Windshield Washer Fluid is the lowest that will allow adequate freeze protection and visibility in rainy weather in Type “A” areas.

Response: ARB staff agrees with this comment and have proposed a VOC limit of 25 percent by weight.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2003)

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

3. Air Resources Board, Staff Report. Proposed Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products: Phase I. August, 1990. (ARB, 1990a)

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

5. Air Resources Board, Final Statement of Reasons for Rulemaking, Including Summary of Comments and Agency Responses: Public Hearing to Consider the Adoption of a Statewide Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products. October, 1990. (ARB, 1990c)

6. CSPA Automotive and Solvent Products. Technical Seminar for CARB Staff. July 13, 2006. (Honeywell CPG-Prestone, 2006)

B. Bathroom and Tile Cleaners (non-aerosol)

Product Category Description:

Bathroom and tile cleaners are specialty cleaning products designed and specifically labeled to clean a variety of household and commercial bath or restroom surfaces. Included in this category are both all-purpose / multi-surface bathroom cleaners and hard surface bathroom cleaners. Products labeled primarily to clean the surfaces inside toilet bowls or urinals are excluded from this category.

Bathroom and tile cleaners include products that remove mold and mildew stains, rust stains, scale due to water hardness, and products that make disinfecting claims.

Bathroom and tile cleaners are packaged in both aerosol and non-aerosol forms and were initially regulated under “Phase I” of the Consumer Products Regulation in 1990. At that time, the Board adopted a 7 percent by weight VOC limit for aerosols and a 5 percent by weight VOC limit for all other forms. The effective date for these limits was January 1, 1994. We believe technology now exists to further reduce the VOC content limit for non-aerosol Bathroom and Tile Cleaners.

Table VI-3 below summarizes the sales and emissions from non-aerosol bathroom and tile cleaners based on the results of the ARB's 2003 Consumer and Commercial Products Survey (ARB, 2003). As shown in Table VI-3, non-aerosol bathroom and tile cleaners have estimated VOC emissions of about 0.4 tpd (802 pounds per day) in California.

Table VI-3
Bathroom and Tile Cleaner (non-aerosol)*

Product Form	Number of Products	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Non-aerosol	337	90,992	802

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

As shown in Table VI-3, this category contains 337 products with sales of about 91,000 pounds per day. The sales-weighted average VOC content is about one percent.

Product Use and Marketing:

Non-aerosol bathroom and tile cleaners are used on tile, porcelain, and other hard surfaces such as toilet fixtures, sinks, tubs, and shower stalls. Non-aerosol bathroom and tile cleaners include products or product forms which do not use a pressurized spray system to dispense product ingredients by means of a propellant contained in a product or a product's container.

These products can be purchased through many sales outlets including grocery stores, discount stores, wholesalers, mass merchandisers, hardware stores, warehouse stores, and home centers. Bathroom and tile cleaners are also sold to industrial or institutional users through distributors or through direct sales by the manufacturer.

Examples of non-aerosol product forms include "wipes," pump sprays, pastes, ready-to-use liquids, and liquid concentrates. These products are typically applied using a trigger pump spray, mop and bucket, or wiped on with a sponge, cloth, or "wipe/towelette." Depending on the substrate, the product may or may not need to be rinsed off. To prevent excessively fast run-off of the cleaning product, some pump spray products use special nozzles that mechanically mix and dispense the product as "foam." These specialty products are formulated to remove not only normal soils found on bathroom surfaces, but also hard water deposits, soap scum, rust stains and discolorations due to mold growth.

Product Formulation:

Bathroom and tile cleaners are primarily designed for cleaning the stains and soils due to moisture and water hardness. Bathroom cleaners designed for general

surface cleaning may contain VOC ingredients such as 2-butoxyethanol, isopropyl alcohol, or pine oil. However, these products primarily contain surfactants to penetrate and loosen the soil. In addition, they may contain sequestering agents and specific solvents to dissolve and keep calcium (hardness) deposits, soap scum and rust stains in solution until being rinsed or wiped off. Products that remove mold or mildew stains may also contain an oxidant such as sodium hypochlorite, antimicrobial agents to attack mold and mildew, and alkaline ingredients such as sodium carbonate, sodium silicate or sodium hydroxide. Depending on the soil, some cleaners which target soap scum or water hardness deposits may also contain acids such as hydroxyacetic or sulfamic acids.

Proposed VOC Limit and Compliance:

The proposed VOC limit for bathroom and tile cleaner is 1 percent by weight, effective December 31, 2008. As shown in Table VI-4, using adjusted 2003 emissions, the proposed limit will result in an estimated emission reduction of 260 pounds per day or 0.13 tpd.

Table VI-4 also shows that over 80 percent of the market currently complies with the proposed 1 percent by weight VOC limit.

Table VI-4
Bathroom and Tile Cleaners (non-aerosol) Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Non-Aerosol	1	264	81	260

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

The proposed 1 percent VOC limit is designed to further reduce VOC emissions from non-aerosol bathroom and tile cleaners. We anticipate that manufacturers of non-complying products will reformulate using LVP-VOC glycol ethers, inorganic salts, and/or a mild, non-VOC acid such as glycolic acid.

REFERENCE

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2003)

C. Brake Cleaners

Product Category Description:

Brake cleaners are defined in the Consumer Products Regulation as products designed or labeled to remove oil, grease, brake fluid, brake pad material, and dirt from motor vehicle brake mechanisms. These products are sometimes also labeled for use in cleaning dirt or grease from other motor vehicle parts.

The VOC limit for automotive brake cleaners was last amended under the Midterm II Amendments to the Consumer Products Regulation adopted in October of 1999, and a description of these products is also included in the staff report for that item (ARB, 1999). At that time, the Board adopted a 45 percent VOC limit for these products, effective January 1, 2003. On April 27, 2000, ARB adopted the Airborne Toxics Control Measure (ATCM) for Emissions of Chlorinated Toxic Air Contaminants from Automotive Maintenance and Repair Activities (AMR). This ATCM prohibited Brake Cleaners from containing the chlorinated compounds perchloroethylene, methylene chloride, and trichloroethylene, effective December 31, 2002 (ARB, 2000).

Table VI-5 below summarizes the sales and emissions from brake cleaners based on the results of the ARB's 2003 Consumer and Commercial Products Survey (ARB, 2003). As shown in Table VI-5, Brake Cleaners have estimated VOC emissions of about 4.84 tpd (9,680 pounds per day) in California. Brake Cleaners are sold in both the aerosol and liquid forms, with the aerosol form dominating the market in both sales and emissions.

Table VI-5
Brake Cleaner*

Product Form	Number of Products	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
All Forms	112	23,016	9,680

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

Product Use and Marketing:

Brake cleaners are used by both "do-it-yourself" and professional mechanics. These products are used on both disc and drum brake components such as drums, rotors, brake cylinders, linings, and springs.

Aerosol brake cleaners are typically sprayed on the entire brake assembly prior to repairs to remove dirt, oil, grease, or other contaminants. However, some manufacturers recommend that their products not be used on rubber parts and brake pads or linings. Brake cleaners are also used on individual components after

disassembly, often to remove greasy fingerprints or other contaminants from friction surfaces.

Liquid brake cleaners are used primarily by mechanics. When using these products, mechanics disassemble brake components and immerse them in the liquid product for several minutes or longer. These types of products may be used repeatedly until they become too dirty and must be replenished.

Some liquid products are water-based formulations and are used in portable "bird-bath" brake cleaning systems. These systems generally consist of a reservoir of the cleaning solution with a collection pan on top and a nozzle and brush. Mechanics typically spray down the entire brake assembly with these systems and use the brush as necessary to clean the brake components. The dirty solution drips off the brake assembly and is collected in the pan and routed into the reservoir which may be filtered or skimmed to remove brake dust and oil, extending the life of the cleaning solution.

Brake cleaners are sold primarily in auto parts stores, hardware stores, and by mass merchandisers. Manufacturers or distributors may also sell these products directly to large customers such as auto repair facilities, car dealerships, and companies that maintain their own vehicle fleets (ARB, 1999).

Product Formulation:

Brake cleaners are typically composed of organic solvents designed to remove grease, oil, and other contaminants from brake parts. These include acetone, toluene, methanol, heptane, and xylene. Many of these also have VOC exempt solvents such as acetone. Aerosols usually contain a propellant such as carbon dioxide or propane. There are also low and near-zero VOC water-based products. Water-based products generally use glycol ethers such as propylene glycol t-butyl ether but may also contain aromatic solvents, inorganics, alcohols and exempt solvents like acetone.

Proposed VOC Limit and Compliance:

The proposed VOC limit for Brake Cleaner is 10 percent by weight, effective December 31, 2008. As shown in Table VI-6, using adjusted 2003 emissions, the proposed limit will result in an estimated emission reduction of 7,400 pounds per day or 3.7 tons per day.

Table VI-6 also shows that 5 percent of the market currently complies with the proposed 10 percent VOC limit. The complying market share includes aerosol and non-aerosol products with non-aerosol products making up the majority of the market share. However, of the 21 complying products, more are aerosol products than are non-aerosol.

Table VI-6
Brake Cleaner Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	Emissions Reductions (lbs/day)**
All Forms	10	21	5.1	7,400

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

The 10 percent by weight VOC limit is proposed based on staff's review of existing or new technologies and on results of a research project funded by ARB. The goal of the research was to develop low VOC and non-toxic aerosol maintenance products.

In 2003, the Institute for Research and Technical Assistance (IRTA) with assistance from a Technical Review Committee (TRC) undertook a project to develop low VOC and low toxic automotive maintenance products. The TRC consisted of government agencies, environmental organizations, automotive repair shops and facilities, product formulators and manufacturers. Working with the TRC, IRTA was able to demonstrate effective aerosol automotive maintenance products, including brake cleaners. The products were used by technicians at several automotive maintenance facilities. Under these "real world" scenarios the technicians found the products to perform as well, or nearly as well as, existing solvent-based products (IRTA, 2004).

The IRTA Study was reviewed and approved by the Research Screening Committee. The Board's legislatively mandated Research Screening Committee consists of scientists, engineers, and others knowledgeable, technically qualified, and experienced in air pollution problems. The Committee meets approximately four times a year to review proposed and completed research projects (IRTA, 2004).

The products that performed well had no more than 10 percent VOC by weight. Products that were effective were based on the following technologies: LVP-VOC, alkaline cleaning, surfactant, or exempt VOC solvents. Typical propellants that were effective at delivering the products were hydrocarbons or carbon dioxide. To meet the proposed 10 percent VOC limit, we expect products to use these technologies (IRTA, 2004).

Other reformulation options that could be used by manufacturers to meet the proposed limit include the use of more acetone as well as exempt propellants. Staff also believes that the water-based technology currently used in "bird-bath" cleaning systems can be transferred to the aerosol form. This has been shown by current products on the market, in California, with similar technology that do meet the proposed limit (Kyzen, 2006). Staff believes these options provide a viable and technically feasible way for the industry to create effective products at the proposed VOC limit

without the use of high VOC or toxic compound formulations. Products would be either water-based or solvent-based using LVP-VOCs or exempt VOC solvents.

Issues:

1. Issue: The proposed VOC limit for Brake Cleaner is not technologically or commercially feasible due to issues such as dry time and efficacy.

Response: Survey data show that there are products currently able to meet the limit. As explained in the "Proposed VOC limit and Compliance" section, ARB contracted with IRTA to show that nontoxic, low VOC alternatives can be formulated at the proposed limit and perform comparably to existing products.

2. Issue: ARB staff should not use the IRTA study as proof of low VOC capability because the study is flawed in concept and execution.

Response: ARB staff disagrees with the comment. The draft final report was reviewed and approved by ARB's Research Scientific Committee, a panel of independent distinguished scientists. In addition to results from the IRTA study, we note that 5 percent of the market currently complies with the proposed limit. The field study conducted by IRTA, at automotive repair facilities, represents real-world scenarios. ARB staff is also aware of products recently introduced to the market, and other products soon to be introduced to the market, that already comply with the proposed 10 percent VOC standard (Kyzen, 2006).

3. Issue: The proposed limits will cause consumers and institutional users to use gasoline or other packaged solvents.

Response: This is unlikely because most institutional facilities such as auto maintenance and repair are under air district permit. Use of gasoline or other solvents would be a violation of permits and local district rules. We also note that products effectively perform at the proposed limit so there is no incentive to switch in this manner.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2003)

2. Air Resources Board. Final Statement of Reasons, Public Hearing to Consider the Airborne Toxics Control Measure for Emissions of Chlorinated Toxic Air Contaminants from Automotive Maintenance and Repair Activities. August 27, 2000. (ARB, 2000)
3. Air Resources Board. Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation: Midterm Measures II. September 10, 1999. (ARB, 1999)

4. Institute for Research and Technical Assistance (IRTA). Safer Alternatives to Solvent Aerosol Automotive Products. December, 2004. (IRTA, 2004)

5. Kyzen Corporation. Product Bulletin: Kyzen Cyber Solv. September, 2006. (Kyzen, 2006)

D. Carburetor or Fuel-Injection Air Intake Cleaners

Product Category Description:

Carburetor or fuel-injection air intake cleaners are designed to remove fuel deposits, oil, dirt, and other contaminants from carburetors, chokes, and associated linkages, or the air intake systems of fuel injected vehicles. These products are sometimes also labeled to remove deposits from fuel injectors, engine intake valves, and the combustion chamber**.** However, these deposits are more commonly removed by products designed to be introduced directly into the fuel lines or added to the fuel storage tank. These products are excluded from the definition. In this rulemaking, we are proposing a clarifying amendment to the existing definition that would exclude products designed exclusively to be introduced directly into vacuum lines during engine operation.

Removal of fuel deposits is necessary because they can cause driveability problems such as hard starting, rough idling, and poor mileage. These deposits are formed by the oxidation and polymerization of fuel components, particularly olefins, and can form inside carburetor throats, idle air circuits, metering jets, and on throttle and choke plates. Deposits can also form in the air intake systems of fuel injected vehicles, particularly inside throttle bodies and on throttle plates. Removal of oil and dirt from the external surfaces of carburetors and throttle bodies is desirable because contaminants can sometimes cause linkages or other moving parts to stick (ARB, 1999).

Carburetor or fuel-injection air intake cleaners were regulated under “Midterm Measures II” Amendments to the Consumer Products Regulation adopted in October of 1999, and a description of these products is also included in the staff report for that item (ARB, 1999). At that time, the Board adopted a 45 percent VOC limit for these products which was effective on January 1, 2003. On April 27, 2000, ARB adopted the Airborne Toxics Control Measure (ATCM) for Emissions of Chlorinated Toxic Air Contaminants from Automotive Maintenance and Repair Activities (AMR). This ATCM prohibited Carburetor or Fuel-Injection Air Intake Cleaners from containing the chlorinated compounds perchloroethylene, methylene chloride, and trichloroethylene in AMR facilities, effective December 31, 2002 (ARB, 2000).

Table VI-7 below summarizes the sales and emissions from carburetor or fuel-injection air intake cleaners based on the results of the ARB’s 2003 Consumer and Commercial Products Survey (ARB, 2003). As shown in Table VI-7, 110 Carburetor or Fuel-Injection Air Intake Cleaners products were reported in the survey, accounting for over 12,000 pounds per day in sales. The aerosol form dominates the market with over

87 percent of the sales in this category. Carburetor or Fuel-Injection Air Intake Cleaners have estimated VOC emissions of about 2.59 tpd (5,184 pounds per day) in California. The sales weighted average VOC is 47.2 percent, which is above the current limit. This is due to the products which are under the consumer products regulation's "sell-through" provision.

Table VI-7
Carburetor or Fuel-Injection Air Intake Cleaners*

Product Form	Number of Products	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
All Forms	110	12,292	5,184

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

Product Use and Marketing:

Carburetor or fuel-injection air intake cleaners are used by both "do-it-yourself" and professional mechanics. These products are used during routine maintenance and during repairs. Both aerosol and liquid products are sold, and these forms are used differently. Carburetor or fuel-injection air intake cleaners are required to be registered with the U.S. EPA as fuel additives.

The aerosols are used to quickly remove deposits from carburetors, throttle bodies, and associated parts, usually while in place. Aerosols can be used to remove fuel deposits from the inside surfaces of carburetors by spraying into the carburetor throat while the engine is running. The solvents in the product combine with the fuel and are carried throughout the inside passages of the carburetor, eventually reaching the combustion chamber. These methods feed the product directly into the intake valves, with the engine running, where it will ultimately be combusted (ARB, 1999).

Aerosol products are used similarly in fuel-injection cleaning, which is now the dominant application, as carburetors are no longer used on most motor vehicles. New products are being introduced that are designed exclusively to be introduced directly into vacuum lines. These products are to be used to clean fuel injection systems, with the engine in operation. Consequently, all VOCs should be combusted in the engine. We are proposing clarifying language to the definition to expressly exclude these specific products.

For the liquid products, carburetors and associated parts are generally disassembled and immersed in a container of the liquid product. Some products include a basket that can be used to hold parts that are immersed. Often sensitive parts such as plastics or gaskets must be removed prior to immersion (ARB, 1999).

Carburetor or fuel-injection air intake cleaners are sold primarily in auto parts stores, hardware stores, and by mass merchandisers. Manufacturers or distributors

may also sell these products directly to large customers such as auto repair facilities, car dealerships, and companies that maintain their own vehicle fleets (ARB, 1999).

Product Formulation:

Carburetor or fuel-injection air intake cleaners are typically composed of a variety of solvents including aromatic hydrocarbons, such as xylene, and oxygenated solvents including various alcohols. Exempt compounds such as acetone are also used. The active ingredient is normally an inorganic compound, usually a surfactant, designed to adhere to, and aggregate, soils for removal. To meet the current limit, most products were reformulated using additional acetone. However, there are a few products using water in conjunction with the aforementioned solvents in their formulations.

Proposed VOC Limit and Compliance:

The proposed VOC limit for Carburetor or Fuel-Injection Air Intake Cleaner is 10 percent by weight, effective December 31, 2008. As shown in Table VI-8 using adjusted 2003 emissions, the proposed limit will result in an estimated emission reduction of 4,000 pounds per day or 2.0 tpd.

Table VI-8 also shows that over 3 percent of the market currently complies with the proposed 10 percent VOC limit, none of which are aerosol.

Table VI-8
Carburetor or Fuel-Injection Air Intake Cleaners Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	Emissions Reductions (lbs/day)**
All Forms	10	2	3.3	4,000

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

The proposed 10 percent VOC limit is designed to allow the industry to formulate effective products using alternative organic solvents, such as methyl esters, which have been shown to be effective when used with acetone. Because of the potential for the engine to stall, these products don't typically contain water. The limit is proposed based on staff's evaluation of technologies and a research project funded by ARB.

In 2003, the Institute for Research and Technical Assistance (IRTA) with assistance from a Technical Review Committee (TRC) undertook a project to develop low VOC and low toxic automotive maintenance products. The TRC consisted of government agencies, environmental organizations, automotive repair shops and facilities, product formulators and manufacturers. Working with the TRC, IRTA was able to demonstrate effective aerosol automotive maintenance products, including carburetor or fuel-injection air intake cleaners. The products were used by technicians at several

automotive maintenance facilities. Under these "real world" scenarios the technicians found the products to perform as well, or nearly as well as, existing solvent-based products.

The IRTA Study was reviewed and approved by the Research Screening Committee. The Board's legislatively mandated Research Screening Committee consists of scientists, engineers, and others knowledgeable, technically qualified, and experienced in air pollution problems. The Committee meets approximately four times a year to review proposed and completed research projects.

The products that performed well had no more than 10 percent VOC by weight. Products that were effective in this category were based on using combinations of methyl esters and acetone. Typical propellants that were effective at delivering the products were hydrocarbons or carbon dioxide. To meet the proposed 10 percent VOC limit, we expect products to use these technologies (IRTA, 2004).

Staff believes these options provide a viable and technically feasible way for the industry to create effective products at the proposed VOC limit without the use of high VOC or toxic compound formulations.

Issue:

1. Issue: The proposed VOC limit for Carburetor or Fuel Injection Air Intake Cleaner is technologically forcing. Product needs to remove very difficult residues from various auto parts, leave no residue, be safe for automotive fuel systems, and meet U.S.EPA fuel additive requirements.

Response: As explained in the "Proposed VOC Limit and Compliance" section above, the VOC limit would provide for development of efficacious products by using varying amounts of acetone, or other exempt solvents, with an LVP-VOC, such as methyl esters or hydrocarbons, and maintain efficacy without interfering with U.S.EPA fuel additive requirements.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2003)

2. Air Resources Board. Final Statement of Reasons, Public Hearing to Consider the Airborne Toxics Control Measure for Emissions of Chlorinated Toxic Air Contaminants from Automotive Maintenance and Repair Activities. August 27, 2000. (ARB, 2000)

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

4. Institute for Research and Technical Assistance (IRTA). Safer Alternatives to Solvent Aerosol Automotive Products. December, 2004. (IRTA, 2004)

E. Construction, Panel and Floor Covering Adhesive

Product Category Description:

Construction, Panel and Floor Covering Adhesive is currently defined as a non-aerosol one-component adhesive that is designed or labeled for the installation, remodeling, maintenance or repair of: (A) structural and building components that include, but are not limited to, beams, trusses, studs, paneling (drywall or drywall laminates, fiberglass reinforced plastic (FRP), plywood, particle board, insulation board, pre-decorated hardboard or tileboard, etc.), ceiling and acoustical tile, molding, fixtures, countertops or countertop laminates, cove or wall bases, and flooring or subflooring; or (B) floor or wall coverings that include, but are not limited to, wood or simulated wood covering, carpet, carpet pad or cushion, vinyl-backed carpet, flexible flooring material, nonresilient flooring material, mirror tiles and other types of tiles, and artificial grass. Construction, Panel and Floor Covering Adhesive does not include Floor Seam Sealer. Construction, Panel and Floor Covering Adhesive also does not include units of product, less packaging, which weigh more than one pound and consist of more than 16 fluid ounces.

The local air districts in California regulate the use of large size (greater than 16 fluid ounces or one pound) and industrial-use adhesives. Following is a list of local air districts and their corresponding currently applicable adhesive regulations:

- Antelope Valley AQMD, Rule 1168, Adhesive Applications;
- 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;
- Ventura County APCD, Rule 74.20, Adhesives and Sealants; and
- Yolo-Solano AQMD, Rule 2-33, Adhesive Operations.

In December 1998, the ARB published a 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 adhesives and sealants used in commercial and manufacturing processes that are regulated by the districts. The VOC limits in the RACT/BARCT are largely based on limits adopted in existing district adhesive and sealant rules. The district RACT/BARCT limits are established on the basis of grams VOC per liter [g/l], less water and exempt solvents. There are VOC limits for seven adhesive subcategories in the RACT/BARCT that relate to the construction, panel, and floor covering adhesive category for consumer products. Most of the VOC limits for these subcategories range from 130 g/l to 250 g/l; however, there is one specialty substrate VOC limit of 660 g/l.

Volatile organic compound limits and the small size requirements were first introduced for adhesives used in household and institutional settings during the development of the ARB "Phase II" Consumer Products Regulation. 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 (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. Construction and panel adhesives were combined with carpet and tile adhesives to be regulated as "Construction, Panel and Floor Covering Adhesive" category under the "Midterm Measures II" regulation, adopted in October of 1999, and a description of these products is also included in the Initial Statement of Reasons report for that item (ARB, 1999). ARB staff determined the above to be appropriate because products in both categories were distributed to similar businesses, used in the construction, remodeling, maintenance, and repair of residential and commercial buildings. In addition, products making both claims were reported in the survey conducted by ARB staff for the "Midterm Measures II" rulemaking. At that time, the Board adopted a 15 percent VOC limit for these products, which became effective on December 31, 2002. Floor covering adhesives were not subject to a VOC limit until the effective date of the proposed limit for the combined category.

Table VI-9 below summarizes the sales and emissions from the construction, panel, and floor covering adhesives based on the results of the 2003 Survey. The information in Table VI-9 does not include non-aerosol adhesive products that are sold in large container sizes (more than one pound or 16 fluid ounces), which are regulated by many local air districts in California.

Seventy-six construction, panel, and floor covering adhesive products were reported in the 2003 Survey. The sales of construction, panel and floor covering adhesive products are estimated to be 26,468 pounds per day. After adjusting for market coverage, the 2003 VOC emissions are estimated at 1,924 pounds per day from the sales of small size containers. The sales-weighted average for the small size containers of construction, panel, and floor covering adhesives is estimated to be 9.9 percent VOC.

Table VI-9
Construction, Panel and Floor Covering Adhesive*

Product Form	Number of Products	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Non-aerosol	76	26,468	1,924

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

Product Use and Marketing:

Construction, panel, and floor covering adhesives are used to construct, remodel, maintain, or repair houses, buildings, bridges, and other types of structures and their appurtenances. The construction industry is one of the largest users of adhesives, requiring about 40 types of adhesives in about 30 different applications (ARB, 1999). These products are used on most types of substrates including wood, wood-derived products (plywood, hardboard, particle board, and insulation board), steel, concrete, masonry, and fiberglass reinforced materials. Another major use for these products is in the installation of decorative finishing materials (e.g., floor and wall carpeting and tiles, paneling, cove bases, ceiling tiles, etc.) to the inside of buildings.

Appropriate product selection must be made for each application on the basis of performance requirements (such as durability and strength), type of substrates, working properties needed, desired production rates, and cost. Environmental conditions such as prolonged soaking, wetting and drying cycles, extremely low or high temperatures, and other adverse conditions that may arise during construction and service life must be considered when selecting the appropriate adhesive to use.

Construction, panel, and floor covering adhesives are sold in sizes ranging from 4 fluid ounce tubes to 55 gallon drums. The more common sizes used in construction projects are 10 to 11 fluid ounce and 29 fluid ounce disposable cartridges that fit in half-barrel caulking guns. As mentioned before, products greater than 16 fluid ounces or one pound and industrial-use adhesives are regulated by California local air pollution control districts.

Construction, panel, and floor covering adhesives are primarily sold through hardware stores, home supply centers, warehouse clubs, and discount chain stores. Distributors also sell these products directly to firms with a large customer base, such as contractors, residential and commercial builders, janitorial companies and corporations, and organizations that maintain their own facilities.

Individuals or “do-it-yourselfers”, and professionals employed in residential and commercial development sites use construction, panel, and floor covering adhesives. Although these products are used in the “manufacture” or “construction” of homes and facilities at residential and commercial development sites, the adhesive products do not qualify as “industrial” use products as defined in the consumer products regulation

because the development sites are temporary. In other words, the adhesive products are not being used at a permanent site or establishment to produce goods or commodities. In addition, many of these adhesive products are available for purchase at hardware stores, home supply centers, and warehouse clubs by both professional contractors and household users.

Product Formulation:

Typical construction, panel, and floor covering adhesives may contain any combination of the following components: diluent, binder, catalyst, hardener, accelerator, inhibitor, retarder, filler, plasticizer, stabilizer, and wetting agent (ARB, 1999).

The diluent (water-based or solvent-based) is the solvent vehicle for other adhesive components which also provides viscosity control to make a uniformly thin adhesive coating possible. The binder (resin system) may be the most important component because it provides the adhesive and cohesive strength in the bond. Fillers are non-adhesive materials that improve the working properties, permanence, strength, or other qualities of the adhesive bond. Catalysts and hardeners are curing agents for adhesive systems, and accelerators, inhibitors, and retarders control the curing rate. Plasticizers provide the adhesive bond with flexibility or distensibility. Stabilizers help the adhesive increase its resistance to adverse service conditions such as light, heat, radiation, etc. Wetting agents promote interfacial contact between the adhesive and adherends (substrates) by improving the wetting and spreading qualities of the adhesive. Depending on the particular type of formulation, additional components such as tackifiers, humectants, thickeners, and foam control agents may be used (ARB, 1999).

The water-based formulations that are included in the 2003 Survey contain water in the range of 10 to 50 percent by weight. Although water is the primary diluent, some VOC co-solvents are used in the range of 0.1 to 12 percent and may include stoddard solvent, mineral spirits, toluene, light solvent aliphatic naphtha or ethyl alcohol. Some formulations also use LVP-VOCs such as ethylene glycol and propylene glycol ranging from 0.1 to 4 percent. Resins used in these formulations may include acrylic resin, acrylic copolymer, styrene butadiene polymer or acrylonitrile copolymer in amounts that range from 1 to 40 percent. The most common fillers used are limestone (calcium carbonate), kaolin and silica (quartz, crystalline and amorphous) in the range of 1 to 80 percent.

The typical solvent-based formulations can contain the following VOC diluents: toluene, xylene, hexane, hydrotreated light petroleum distillate, dimethylpentane, dimethylbutane, cyclohexane, isohexane, or light aliphatic solvent naphtha in the range of 0.1 to 15 percent. Exempt compounds, such as acetone and methyl acetate, may also be used as a diluent in the range of 3 to 25 percent. The resins found in these formulations may include polymethylene polyphenyl isocyanate, methylene bisphenyl diisocyanate, styrene-butadiene polymer, and aromatic hydrocarbon resin in the range

of 1 to 60 percent. The fillers may include silica (quartz, crystalline, and amorphous), talc, kaolin, and limestone (calcium carbonate) in amounts that range from 1 to 90 percent. A few formulations may also contain titanium dioxide as a colorant in up to 15 percent by weight.

All of the floor covering adhesives, most of the general purpose construction adhesives, and some of the subfloor adhesives reported in the 2003 Survey are water-based. Some of the general purpose adhesives and subfloor adhesives are solvent-based.

Proposed VOC Limit and Compliance:

The proposed VOC limit for construction, panel and floor covering adhesives is 7 percent by weight, effective December 31, 2008. As shown in Table VI-10, using adjusted 2003 emissions, the proposed limit will result in an estimated emission reduction of 818 pounds per day or 0.4 tons per day for the Construction, Panel and Floor Covering Adhesive category.

Table VI-10
Construction, Panel and Floor Covering Adhesive Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Non-aerosol	7	42	52.7	818

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

Complying products include water-based and solvent-based technologies. The proposed limit is expected to mainly affect solvent-based products. Reformulation options include switching from solvent-based formulations to water-based formulations, using alternative LVP-VOC solvents or a combination of VOC and LVP-VOC solvents, and using exempt VOCs such as acetone and methyl acetate. These alternative ingredients are already being used in some of the general purpose construction adhesives.

Issue:

1. Issue: The industry proposed a separation of construction, panel and floor covering adhesive category into three subcategories with different VOC limits: general purpose construction adhesive with a 7 percent VOC limit, floor covering adhesive with a 1.5 percent VOC limit, and subfloor adhesive with 10 percent VOC limit (NPCA/ASC, 2006).

Response: After careful analysis of the data, staff didn't believe it was necessary to divide the category into three subcategories. Products complying with

staff proposed 7 percent VOC limit were reported for each of these subcategories, indicating that it is technologically feasible to formulate complying multipurpose construction adhesives, floor covering adhesives and subfloor adhesive products. While the 2003 Survey data indicated that most of the floor covering adhesives currently would meet the industry proposed 1.5 percent VOC limit, ARB staff has proposed a single limit. We believe that a single limit would be less complicated to implement and allow for products that make claims falling in more than one subcategory. Industry representatives are generally supportive of ARB proposal (NPCA, 2006).

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2003)

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

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

4. 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, 1991b)

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

6. 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)

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

8. NPCA. Comments on ARB Proposed Amendments to the Consumer Products Regulation (CONS-2). September 25, 2006. (NPCA, 2006)

9. NPCA/ASC. NPCA/ASC Proposal for Technologically and Commercially Feasible VOC Standards for Construction Adhesives. July 21, 2006. (NPCA/ASC, 2006)

F. Disinfectant

Product Category Description:

Disinfectant is defined as any product intended to destroy or irreversibly inactivate infectious or other undesirable bacteria, pathogenic fungi, or viruses on surfaces or inanimate objects, and whose label is registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA, 7 U.S.C. 136, et seq.). "Disinfectant" does not include any of the following: (A) products labeled solely for use on human or animals, (B) products labeled solely for agricultural use, (C) products labeled solely for use in swimming pools, therapeutic tubs, or hot tubs, (D) products, which are (1) sold exclusively to medical or veterinary establishments, and (2) are labeled to be used on heat sensitive critical, or semi-critical medical devices, or medical equipment surfaces prior to high level disinfection, and (E) products, which are subject to a VOC limit under another regulated category in section 94509(a), as dictated by the primary use indicated on the principal display panel.

Disinfectants were first defined under "Phase II" of the consumer products regulation adopted in January of 1992, and a description of these products was included in the staff report for that item (ARB, 1991a). However, the Board did not adopt the proposed VOC limit for this category, since the California Department of Health Services (DHS) recommended that additional study be performed before specific VOC limits for aerosol disinfectants were adopted.

Disinfectants are anti-microbial pesticides. As such, they must be registered with the U.S. Environmental Protection Agency (U.S. EPA) according to FIFRA requirements and by the California Department of Pesticide Regulation. The U.S. EPA requires manufacturers to test formulations by using accepted methods for microbicidal activity, stability, and toxicity to animals and humans (CDC, 2003). FIFRA requires users of products to follow the labeling directions. The following statement appears on all EPA-registered product labels under the Directions for Use heading: *"It is a violation of federal law to use this product in a manner inconsistent with its labeling."* To be effective, products must be used in accordance with label directions, such as dilution, contact time and method of application.

The U.S. EPA divides disinfectant products into two major types: hospital use disinfectants and general use disinfectants. Hospital use disinfectants are used in medical and dental settings on walls, floors, instruments and other surfaces. General use disinfectants are the majority of products used in households.

Under FIFRA requirements, a general disinfectant has limited efficacy claims if it effectively inactivates a specific microorganism group only, such as gram positive (*Staphylococcus aureus*) or gram negative bacteria (*Salmonella choleraesuis*). If a disinfectant inactivates both gram positive and gram negative bacteria groups then it is considered a broad spectrum disinfectant. A hospital disinfectant is a broad spectrum disinfectant that must also be effective against *Pseudomonas aeruginosa*. Many

disinfectants also list fungicidal and virucidal claims, which must be substantiated with performance requirements for each specific organism (U.S. EPA).

The Health and Safety Code 41712 (e)(1) directs the ARB to consider recommendations from a health agency (local, state or federal) regarding regulation of health benefit products. This process was put in place to ensure that public health would not be compromised by regulating the VOC content of such products. Because disinfectants are considered health benefit products staff consulted with DHS to discuss the proposed VOC limits and receive their expert advice as to whether adopting the proposed limits would affect product efficacy.

Table VI-11 below summarizes the sales and emissions from disinfectants based on the results of the ARB's 2003 Consumer and Commercial Products Survey (ARB, 2003). As shown in Table VI-11, disinfectants are sold in both the aerosol and non-aerosol forms, with non-aerosol products dominating the market in terms of sales. However, the aerosol products contribute approximately 80 percent of the VOC emissions from this category. Disinfectants are one of the larger emissions sources in the consumer products inventory, with estimated VOC emissions of about 8.5 tpd (16,966 pounds per day) in California. The sales weighted average VOC content for aerosol products is 76.3 percent by weight and 0.5 percent by weight for non-aerosol products, considering dilutions.

Table VI-11
Disinfectants*

Product Form	Number of Products	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Aerosol	63	17,834	13,610
Non-aerosol	337	207,016	3,356
Total	400	224,850	16,966

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

Product Use and Marketing:

The disinfectant category consists of aerosols, liquids, powders and granules, pumps, foams and wipes (ARB 2003). Disinfectants are used in household, industrial and institutional (I&I) and health care settings. Aerosol disinfectants have a significant share of the household market, while liquids dominate in the Institutional and Industrial (I&I) and health care markets. Liquid disinfectants provide sufficient disinfection for the I&I market and are more cost effective than aerosols (ARB 1991a).

Product Formulation:

The VOC ingredients in aerosol disinfectants are ethanol, isopropanol, and hydrocarbon propellants (propane, n-butane, and isobutane). The alcohols, along with quaternary ammonium compounds (quats) and phenolics (e.g. 2-phenyl phenol) comprise the active ingredients in aerosol formulations (ARB, 2003). Other VOC or low vapor pressure (LVP-VOC) ingredients may include small amounts of fragrances, glycols, and corrosion inhibitors. According to the 2003 ARB survey data the total VOC content of aerosol disinfectants ranges from 8 to 90 percent by weight with a wide range of efficacy claims. Typically, the higher VOC products provide for a wider range of claims, which include virucidal and tuberculocidal disinfection.

The VOC ingredients in non-aerosol disinfectants are isopropanol, ethanol, pine oil and 2-butoxyethanol. The alcohols, along with phenolics and quats comprise the active ingredients in non-aerosol formulations (ARB, 2003). According to the 2003 ARB survey data, the total VOC content of non-aerosol disinfectants ranges from 0 to 69 percent by weight. Over 97 percent of non-aerosol disinfectants are sold as 0-5 percent VOC by weight and most are diluted with water prior to use.

Proposed VOC Limit and Compliance:

The proposed VOC limits for disinfectants are 70 percent by weight for aerosol products, and 1 percent by weight for non-aerosol products, effective December 31, 2008. To allow the time necessary for FIFRA registration requirements, the effective date of the VOC limits for disinfectants is one year after December 31, 2008, as specified in section 94509(d) of the Consumer Products Regulation. This means the effective date would be December 31, 2009. The sell-through period also starts one year after the proposed date, as specified in section 94509(d).

In consulting with medical experts in the field of public health and manufacturers of disinfectants, we have determined that the proposed VOC limits will still allow disinfectant products to achieve an appropriate level of disinfection and maintain all existing efficacy claims. Staff is continuing to work with DHS staff to ensure that the proposed limits do not adversely impact the efficacy of Disinfectants.

As shown in Table VI-12 the proposed limits for disinfectants will result in an estimated reduction of 2,290 pounds per day, or approximately 1.1 tpd. The complying market share for aerosol disinfectants is over 6 percent with 24 products that currently meet the proposed limit. For the non-aerosol products, the complying market share is over 92 percent with 264 products that currently meet the proposed limit.

Table VI-12
Disinfectant Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Aerosol	70	24	6.4	1,314
Non-aerosol	1	264	92.6	976
Total				2,290

***** Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

Reformulation options that could be used by manufacturers to meet the proposed VOC limit include:

(a) Reduction of alcohol level for both aerosol and non-aerosol forms.

(b) Changing the level of phenolics and non-alcohol active ingredients, such as quaternary ammonium compounds, to help offset a reduction in alcohol.

(c) Reduction of VOC propellant level, and/or substitution of part or all of VOC propellant with non-VOC propellant (e.g. carbon dioxide).

Issues:

1. Issue: These products must remain effective for all types of surfaces because they are health benefit products.

Response: ARB staff agrees. In accordance with state law, ARB staff has consulted with the California Department of Health Services and the disinfectant manufacturing industry to ensure that the proposed VOC limits are achievable while maintaining the same level of efficacy.

2. Issue: CSPA member companies manufacturing these important health-benefit products believe that the 70 percent and 1 percent limits proposed may be technologically and commercially feasible. We therefore are willing to support adoption of 70 percent for aerosol form and 1 percent for non-aerosol form VOC limits for this category.

Response: Comment noted. Staff agrees that the proposed limits are commercially and technologically feasible.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2003)

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

3. 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, 1991b)

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

5. 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)

6. Center for Disease Control and Prevention. Morbidity and Mortality Weekly Report, Appendix A. Regulatory Framework for Disinfectants and Sterilants. December 19, 2003. (CDC, 2003)

7. U.S. Environmental Protection Agency. Disinfectants for use on hard surfaces: Efficacy Data Requirements. DIS/TSS-1 http://www.epa.gov/oppad001/dis_tss_docs/dis-01.htm, January 22, 1982. (U.S. EPA)

G. Engine Degreasers (aerosol)

Product Category Description:

Engine degreasers are designed to remove grease, grime, oil, and other contaminants from the external surfaces of automotive engines and other mechanical parts. These products can also be used to clean engines on motorcycles, boats, lawnmowers, and other powered vehicles**.**

Aerosol engine degreasers were regulated under “Midterm Measures II” of the consumer products regulation adopted in October of 1999, and a description of these products is also included in the staff report for that rulemaking (ARB, 1999). At that time, the Board adopted a 35 percent VOC limit for these products which was effective on December 31, 2004. On April 27, 2000, ARB approved the Airborne Toxics Control Measure (ATCM) for Emissions of Chlorinated Toxic Air Contaminants from Automotive

Maintenance and Repair Activities (AMR). This ATCM prohibited Engine Degreasers from using the chlorinated compounds perchloroethylene, methylene chloride, and trichloroethylene in AMR facilities, effective December 31, 2002.

Table VI-13 below summarizes the sales and emissions from aerosol engine degreasers based on the results of the ARB's 2003 Consumer and Commercial Products Survey (ARB, 2003). As shown in Table VI-13, there are 47 aerosol Engine Degreasers on the market and they account for an estimated VOC emissions of about 1.05 tons per day (2,104 pounds per day) in California. The sales-weighted average VOC is 23.5 percent.

Table VI-13
Engine Degreasers (aerosol)*

Product Form	Number of Products	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Aerosol	47	9,116	2,104

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

Product Use and Marketing:

Engine degreasers are used by both "do-it-yourself" and professional mechanics. These products are normally sprayed onto the engine while it is running or while the engine is still warm. After application, the user is then instructed to allow time for the product to penetrate soils. For tough-to-remove deposits, the user may need to scrub the engine with a brush. The user is then directed to rinse the engine and to dispose of the rinsate in accordance with applicable environmental regulations.

Engine degreasers are used by household, commercial, and institutional consumers. Commercial and institutional users include fleet managers, car washes, automotive detail shops, and car dealerships. Engine degreasers are typically used by themselves, but can be combined with steam or high pressure wash cleaning to maximize the cleaning effectiveness (ARB, 1999).

Product Formulation:

Aerosol engine degreasers vary in formulation, but most share several common features. These degreasers use ingredients such as 2-butoxyethanol, d-limonene, alcohols, LVPs, inorganics, and water. Most use either a hydrocarbon propellant or carbon dioxide to propel the can contents onto the engine surface. The combination of propellant and spray stream is chosen to provide a forceful stream, rather than a misty spray, to enhance the product's cleaning ability. Because it is more desirable to have a forceful stream, aerosol engine degreasers do not need as much propellant as other product categories (ARB, 1999). A forceful stream can be achieved by using a small

amount of a propellant such as propane or isobutane. Higher amounts of propellant are used when a mist is needed due to the blending of different propellants.

Foaming is also a desired characteristic in this category because extended contact time, included with the forceful spray, allows for a more thorough cleaning action. Products that foam are very effective when allowed to soak in and penetrate the soils for a small amount of time before rinsing off.

Proposed VOC Limit and Compliance:

The proposed VOC limit for Engine Degreasers (aerosol), is 10 percent by weight, effective December 31, 2008. As shown in Table VI-14, using adjusted 2003 emissions, the proposed limit will result in an estimated emission reduction of 1,240 pounds per day or 0.62 tons per day.

Table VI-14 also shows that 9.1 percent of the market currently complies with the proposed 10 percent VOC limit.

Table VI-14
Engine Degreasers (aerosol) Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Aerosol	10	4	9.1	1,240

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

The 10 percent by weight VOC limit is proposed based on results of a research project funded by ARB. The goal of the research was to develop low VOC and non-toxic aerosol maintenance products.

In 2003, the Institute for Research and Technical Assistance (IRTA) with assistance from a Technical Review Committee (TRC) undertook the project. The TRC consisted of government agencies, environmental organizations, automotive repair shops and facilities, product formulators and manufacturers. Working with the TRC, IRTA was able to demonstrate effective aerosol automotive maintenance products, including general purpose degreasers. The products were used by technicians at several auto maintenance facilities. Under these “real world” scenarios the technicians found the products to perform as well, or nearly as well as existing products.

The products that performed well had no more than 10 percent VOC by weight. Products that were effective were based on the following technologies: LVP-VOC, alkaline, surfactant, or exempt VOC solvents. Typical propellants that were effective at delivering the products were hydrocarbons or carbon dioxide. To meet the proposed 10 percent VOC limit, we expect products to use these technologies.

Other reformulation options that could be used by manufacturers to meet the proposed limit include the use of more acetone, water, LVP, and inorganics as well as exempt propellants. Staff believes these options provide a viable and technically feasible way for the industry to create effective products at the proposed VOC limit without the use of high VOC or toxic compound formulations. This has been shown by current products on the market, in California, with similar technology that do meet the proposed limit (Kyzen, 2006).

Issues:

1. Issue: The proposed VOC limit for Engine Degreaser is not technologically, or commercially, feasible.

Response: Survey data show that 9 percent of the products in this category are currently able to meet the limit. Also, as explained in the "Proposed VOC limit and Compliance" section, research sponsored by ARB demonstrated that non-toxic, low VOC alternative aerosol engine degreaser can be formulated at the proposed limit and be just as effective as those with higher VOC content.

2. Issue: ARB staff should not use the IRTA study as proof of low VOC capability because the study is flawed in concept and execution.

Response: ARB staff disagrees with the comment and feels the study conducted by IRTA was performed in a manner useful to this regulation. ARB believes that the field study conducted by IRTA, at automotive repair facilities, is more relevant than a laboratory study would be. ARB staff has been made aware of specific products on the market, or about to be introduced to the market, that can comply with the proposed 10 percent VOC standard.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2003)

2. Air Resources Board. Final Statement of Reasons, Public Hearing to Consider the Airborne Toxics Control Measure for Emissions of Chlorinated Toxic Air Contaminants from Automotive Maintenance and Repair Activities. August 27, 2000. (ARB, 2000)

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

4. Institute for Research and Technical Assistance (IRTA). Safer Alternatives to Solvent Aerosol Automotive Products. December, 2004. (IRTA, 2004)

5. Kyzen Corporation. Product Bulletin: Kyzen Cyber Solv. September, 2006. (Kyzen, 2006)

H. Floor Polish or Wax

Product Category Description:

Floor Polish or Wax products are designed to polish, protect, or enhance floor surfaces by leaving a protective coating. They are designed to be periodically replenished or replaced. This category does not include spray buff products, products that are only used to clean the floor, floor finish strippers, products for unfinished wood floors, nor coatings subject to architectural coatings regulations. The category does include "clean and polish" products.

Floor Polish or Wax products were regulated under Phase I of the Consumer Products Regulation adopted in October of 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 VOC limits for these products that became effective on January 1, 1994. The VOC limits adopted for Floor Polish or Wax are: 7 percent for products used on flexible flooring material, 10 percent for products used on non-resilient flooring material, and 90 percent for products used on wood floors. Further consideration of products for wood floors has been deferred to the 2007 rulemaking and therefore, will not be discussed in this section.

Table VI-15 below summarizes the sales and emissions from Floor Polish or Wax for resilient (flexible) and non-resilient floors, based on the results of the ARB's 2003 Consumer and Commercial Products Survey (ARB, 2003). Floor Polish or Wax products have estimated VOC emissions of about 0.73 tpd (1,452 pounds per day) in California.

Table VI-15
Floor Polish or Wax*

Products for:	Number of Products	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Resilient floors	340	128,694	1,320
Non-resilient floors	113	9,884	132
Total	453	138,578	1,452

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

Product Use and Marketing:

Floor Polish or Wax is used by both general consumers, as well as commercial and institutional customers. Commercial and institutional products account for a vast majority of reported products and total sales.

Household products for resilient (or flexible) and non-resilient floors are generally applied in a single layer to a clean floor with a mop and allowed to dry. Commercial products for flexible and non-resilient floors are generally applied to a dry, clean floor surface that has been stripped of all prior coats of polish. The user (generally maintenance staff) applies the floor finish with a mop in a thin, even layer, avoiding using excess finish or allowing the product to puddle. The user allows the coating to dry (usually about 30 minutes), then applies another layer. The user repeats this process until the desired number of coats has been applied, usually 3-5 coats total. Depending on the manufacturer recommendations, the final step may then be to buff the finish to a shine ("pop the gloss") using a buffer or burnishing machine. The floor must remain free of foot traffic during the stripping and refinishing process. Therefore, it's important for the process to be completed as quickly as possible, to minimize possible impact to business resulting from down-time (Rohm and Haas, 2006).

Floor Polish or Wax products are sold to household consumers, commercial, and industrial establishments. They can be found at janitorial stores, supermarkets, warehouse and hardware stores, and the Internet, as well as through manufacturers' and distributors' sales representatives.

Product Formulation:

Floor Polish or Wax products for flexible and non-resilient floors are primarily composed of water and polymer solids. Other ingredients include coalescent aids and other modifiers (such as levelers, plasticizers, viscosity modifiers, etc.) that optimize product properties. The coalescent aids are typically volatile glycol ethers that help the polymer solids form a smooth continuous coating over the floor surface. Some floor finishes that use cross-linking polymers often contain inorganic compounds (metallic salts) that foster the linkages.

Proposed VOC Limit and Compliance:

The proposed VOC limits for Floor Polish or Wax products for resilient and non-resilient floors are listed in Table VI-16, and would become effective December 31, 2010. As shown in Table VI-16, using adjusted 2003 emissions, the proposed limit will result in an estimated emission reduction of 948 pounds per day or 0.47 tpd.

Table VI-16 also shows the current complying market share for the proposed limits. A majority of the markets for resilient and non-resilient floors already comply with the proposed VOC limit of one percent.

Table VI-16
Floor Polish or Wax Proposal*

Products For:	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Resilient floors	1	150	66.8	854
Non-resilient floors	1	58	62.5	94
Total				948

***** Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
****** Survey emissions adjusted for complete market coverage (see Chapter IV).

Reformulation options for products for resilient and non-resilient floors include increasing water and solids content, and/or using LVP-VOC coalescent aids. Manufacturers may also develop polymer technology that require less VOC coalescent. A minimal number of product reformulations are anticipated, as the sales weighted average VOC content is 1.025 for products used on resilient floors, and 1.340 for products for non-resilient floors.

Issue:

1. Issue: Several industry representatives have expressed concern over the proposed limit of one percent. They contend that the standard will thwart development of new, harder polymer systems that are easier to maintain and require less frequent stripping and recoating, resulting in increased labor costs and increased overall emissions.

Response: The complying market shares for the proposed limits are both nearly two thirds. The complying products are also some of the highest-sales products reported in the 2003 Survey. Such a high complying market share that includes the most popular products seems to overwhelmingly support the proposed limits of one percent. However, in order to ensure that all of industry has sufficient time to complete the transition, staff is proposing an effective date of December 31, 2010. Staff also reminds manufacturers that alternative means of compliance such as an Innovative Product Exemption may be suitable, if they can demonstrate that use of their higher VOC products truly result in lower VOC emissions compared to a compliant product. Use of an Alternative Control Plan may be appropriate for manufacturers who wish to offset excess emissions from their non-compliant floor polishes with their other regulated products that over-comply with applicable VOC limits.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2003)

2. Air Resources Board, Staff Report. Proposed Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products: Phase I. August, 1990. (ARB, 1990a)

3. Rohm and Haas, Presentation to ARB staff. June 2006. slide 8. (Rohm and Haas, 2006)

I. Furniture Maintenance Product (non-aerosol)

Product Category Description:

Furniture maintenance products are labeled for the purpose of polishing, protecting or enhancing finished wood surfaces other than floors such as paneling, cabinets, and furniture and other furniture surfaces including but not limited to acrylics, ceramics, plastics, stone surfaces, metal surfaces, and fiberglass. These products beautify and enhance natural woodgrain, leaving a clear and shiny surface. These products may be waxes, polishes, or conditioners.

Furniture maintenance products do not include dusting aids or wood cleaners, which are regulated as separate categories (ARB, 2004). Furniture maintenance products also do not include products designed solely for the purpose of cleaning, or products that leave a permanent finish such as stains, sanding sealers, and lacquers.

Furniture maintenance products were originally regulated under Phase I of the Consumer Products Regulation adopted in October of 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 25 percent VOC limit for aerosol forms and 7 percent VOC limit for all other forms except solid/paste forms (effective on January 1, 1994). Effective December 31, 2004, only the aerosol form limit was lowered to 17 percent VOC under "Midterm Measures II" of the Consumer Products Regulation adopted in October of 1999, and the description is included in the staff report for that item (ARB, 1999).

Table VI-17 below summarizes the sales and emissions based on the results of the ARB's 2003 Consumer and Commercial Products Survey (ARB, 2003). The non-aerosol form has estimated California VOC emissions of 0.17 tpd (348 pounds per day).

The non-aerosol form includes liquids and liquid-impregnated wipes, pump sprays, semisolids, and solids. The majority of products reported were liquids.

Table VI-17
Furniture Maintenance Product *

Product Form	Number of Products	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Non-Aerosol	76	7,046	348

***** Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
****** Survey emissions adjusted for complete market coverage (see Chapter IV).

Product Use and Marketing:

Furniture maintenance products are used for polishing, protecting or enhancing finished wood surfaces other than floors and other furniture surfaces including but not limited to acrylics, ceramics, plastics, stone surfaces, metal surfaces, and fiberglass. Furniture maintenance products are usually sold to the consumer market through supermarkets, grocery stores, and warehouse stores. Products sold to businesses are supplied through a variety of ways including direct sales, catalogs, and janitorial stores or services.

Product Formulation:

Furniture maintenance products are emulsions that are applied to a cloth or pad, and are then rubbed into the wood or other furniture surface. During wiping, the water phase is absorbed by the cloth while the solvent/wax/polish phase remains on the wood or other furniture surface. The solvents eventually evaporate, leaving the wax/polish layer.

Some products are designed to perform more than one function, such as “clean” and “protect” furniture. To clean, these products generally rely on solvents to dissolve old wax or polish layers. Dissolving previous wax helps to minimize waxy buildup. Some products also contain silicones, which protects furniture surfaces against water damage. Fragrance is also an ingredient found in many furniture maintenance products, which may add slightly to the overall VOC content of the product. Citrus oils such as lemon or orange are commonly found in these products.

Proposed VOC Limit and Compliance:

The proposed VOC limit for furniture maintenance products is 3 percent by weight, effective December 31, 2008. As shown in Table VI-18, using adjusted 2003 emissions, the proposed limit will result in an estimated emission reduction of 122 pounds per day or 0.06 tpd.

Table VI-18 also shows that nearly 30 percent of the market currently complies with the proposed 3 percent VOC limit.

Table VI-18
Furniture Maintenance Product Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Non-Aerosol	3	46	46.2	122

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

There are reformulation options available that make reductions in VOC content technically and commercially feasible. We expect manufacturers of noncompliant product to formulate products similar to the compliant products, which comprise nearly 30 percent of the market. Reformulation options that can be used to meet the proposed limit include the use of water, LVP-VOC hydrocarbon solvents, glycol ethers, as well as dibasic esters. Many products in this category are water-based, and there are viable non-VOC alternatives available for substitution.

Issue:

1. Issue: Industry recommends a VOC limit of 4 percent.

Response: As shown above in Table VI-20, over 45 percent of the market, as reported in the 2003 Consumer & Commercial Products Survey, already complies with the proposed 3 percent VOC limit. This high complying market share indicates commercial feasibility and customer acceptance for products formulated at or below the proposed 3 percent VOC limit.

REFERENCES

1. 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. May 7, 2004 (ARB, 2004)

2. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2003)

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

4. Air Resources Board, Staff Report. Proposed Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products: Phase I. August, 1990. (ARB, 1990a)

J. General Purpose Cleaners (aerosol)

Product Category Description:

General Purpose Cleaners are products designed and labeled for use on a variety of hard surfaces to remove a multitude of soils. Products in this category are used to clean a variety of surfaces and many types of soils or contaminants from household, commercial and/or institutional surfaces. Because of this, product use claims for these products often overlap with the use claims for similar regulated categories. The regulation addresses this by not applying the "most restrictive limit" provision to products that meet the definition for General Purpose Cleaners.

The Board first regulated General Purpose Cleaners under the "Phase I" Consumer Products Regulation in 1990. At that time, the Board approved a 10 percent by weight VOC limit for all product forms. In 1999, the Board further regulated the non-aerosol product form by adopting a 4 percent by weight VOC limit (ARB, 1999). Although past regulatory actions resulted in significant emission reductions, we believe that technology now exists to further reduce VOC emissions from the aerosol product form. Therefore, we are proposing to amend the regulation to reduce the VOC content limit for aerosol General Purpose Cleaners to 8 percent by weight VOC.

In addition, we are proposing to modify the definition for "General Purpose Cleaner" to include products that are designed to clean stovetops, cook tops, and/or microwave ovens. These products are currently sold and labeled as "stovetop range cleaner," "cook top cleaner," "stovetop cook top cleaner,' or "microwave oven cleaner" and have not been subject to the Consumer Products Regulation. However, these products have functions similar to General Purpose Cleaners in that they are designed to clean hard surfaces and often have a surface conditioning function. Therefore, we believe it is appropriate to include stovetop, cook top, and microwave oven cleaners in the general purpose cleaner category.

Table VI-19 below summarizes the sales and emissions from aerosol General Purpose Cleaners based on the results of the ARB's 2003 Consumer and Commercial Products Survey (ARB, 2003).

Table VI-19
General Purpose Cleaners - Aerosol*

Product Form	Number of Products	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Aerosol	142	6,836	788

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

As shown in the table above, 142 aerosol products were reported with sales of 6,836 pounds per year. Aerosol General Purpose Cleaners have a sales-weighted average VOC (SWA-VOC) content of about 11 percent by weight.

Product Use and Marketing:

General Purpose Cleaners are used by household, commercial, and institutional consumers for general all-purpose cleaning of many soiled surfaces. These products are designed to clean a variety of hard surfaces such as floors, walls, countertops, and kitchen surfaces, including hard surface kitchen appliances. General Purpose Cleaners make claims to remove soils such as grease, oil, dirt, food spills, tobacco smoke, soap scum, and dust. In addition to cleaning, some products may also have a surface conditioning function (e.g. abrasive cleaners), while others make disinfecting claims (ARB, 2003). Products are either applied directly to the surface or indirectly with a cloth or sponge; some scrubbing is usually required but rinsing may or may not be necessary.

General Purpose Cleaners are available from a variety of retail outlets and are sold to household consumers, janitors, restaurants, and other commercial or institutional establishments for general cleaning and, to a certain extent for disinfecting. General purpose cleaner products can be marketed in a variety of ways. Predominantly, these products are marketed as “general purpose cleaner,” “general purpose cleaner/degreaser,” “all-purpose cleaner,” “multi-surface cleaner,” “glass and surface cleaner,” or “disinfectant cleaner.” Another example of how these products are marketed is by using the name of the specific active ingredient in the product’s formulation such as “citrus,” “pine,” “bleach,” or “ammoniated” cleaner.

General Purpose Cleaners that make germ-killing claims are registered with the United States Environmental Protection Agency (U.S. EPA) under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). They must also register with the California Department of Pesticide Regulation (DPR) prior to being marketed in the State of California. For the purpose of this regulation, products primarily labeled as “General Purpose Cleaner” that make anti-bacterial or disinfecting claims are not considered disinfectants.

Product Formulation:

General Purpose Cleaners are formulated with solvents such as, glycol ethers, terpenes, and alcohols to provide efficient active solvency power for most oils, greases, and dirts. This solvency aids in the dissolution mechanism of soil removal. Aerosol products contain between 3 to 8 percent propellant, which is commonly a blend of hydrocarbons (propane / isobutane / n-butane). Products in this category may also contain a mild abrasive, inorganic salt, or an antimicrobial compound. Water usually makes up the remainder of the product ingredients.

For some products, antimicrobial properties are achieved as a “side effect” of other cleaning ingredients such as cationic and anionic surfactants, hypochlorite, or sodium percarbonate (oxygenated bleach) in the formulation. Addition of antimicrobial ingredients such as a quaternary ammonium compound (e.g. alkyl dimethyl benzyl ammonium chloride) is also common (ARB, 2003).

Proposed VOC Limit and Compliance:

We are proposing to reduce the VOC content limit for the aerosol product form of General Purpose Cleaners from 10 percent to 8 percent VOC by weight, effective December 31, 2008. In order to provide time for registration under FIFRA, an additional year is allowed for products that make "disinfecting" or "sanitizing" claims. As shown in Table VI-20, using adjusted 2003 emissions, the proposed limit will result in an estimated emission reduction of 94 pounds per day or 0.05 tons per day.

Table VI-20 also shows that about 12 percent of the market currently complies with the proposed 8 percent VOC limit.

Table VI-20
General Purpose Cleaners Proposal (aerosol)*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Aerosol	8	40	11.5	94

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

As mentioned previously, the VOC ingredients in General Purpose Cleaners are mainly glycol ethers, terpenes, and alcohols. As fast drying is generally not critical to the product performance, a variety of glycol ethers, which qualify as low vapor pressure (LVP)-VOCs are available for reducing the VOC content of cleaners. For example, a LVP-VOC propylene-oxide based glycol ether (i.e. P-series glycol ethers) such as 1-butoxy-2-propanol has a similar evaporation rate to 2-butoxyethanol (ethylene-oxide based glycol ether; E-series glycol ethers), and has a higher efficiency in reducing the surface tension of water which allows for better cleaning. We also expect manufacturers to reformulate with other LVP-VOC solvents such as alkyl methyl esters (soy methyl esters), or hydrocarbons.

Issues:

1. Issue: The proposed VOC limit may not be commercially feasible. To meet the efficacy requirements needed in order for these products to perform on the variety of surfaces and multitude of soils, industry suggests that the VOC limit be set at no lower than 8 percent VOC by weight.

Response: We agree and have revised the proposed VOC limit accordingly.

2. **Issue:** The definition should include: …a product "labeled for use" on a variety of hard surfaces.

Response: We agree and have revised the definition accordingly.

REFERENCES

1. Air Resources Board. Staff Report, Proposed Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products. August, 1990. (ARB, 1990)

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

3. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2003)

K. General Purpose Degreasers

Product Category Description:

General Purpose Degreasers are defined in the regulation as any product labeled 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 do not include products used exclusively in "solvent cleaning tanks or related equipment," or products that are (A) sold exclusively to establishments which manufacture or construct goods or commodities; and (B) labeled "not for retail sale."

To date, the Board has taken several actions pertaining to the regulation of General Purpose Degreasers. Under the Mid-term I Measures Amendments to the Consumer Products Regulation, and Mid-term II Measures Amendments to the Consumer Products Regulation, the Board established volatile organic compound (VOC) limits for both aerosol and non-aerosol product forms.
On April 27, 2000, ARB passed the Airborne Toxics Control Measure (ATCM) for Emissions of Chlorinated Toxic Air Contaminants from Automotive Maintenance and Repair Activities (AMR). This ATCM prohibited the manufacture, use, or sale of automotive maintenance products containing methylene chloride (MeCl), perchloroethylene (Perc), and/or trichloroethylene (TCE). This action included General Purpose Degreasers for automotive end uses (ARB, 2000). As part of the recent 2004 amendments to the Consumer Products Regulation, the Board expanded the prohibition on the use of MeCl, Perc, and TCE to include several more categories, including all General Purpose Degreasers.

The current VOC limit for aerosol General Purpose Degreasers is 50 percent by weight, which has been in effect since 2002. For this regulatory action, we propose to

further reduce the VOC content limit for aerosol General Purpose Degreasers based on recent research and review of available technologies.

Table VI-21 below summarizes the sales and emissions from aerosol General Purpose Degreasers based on the results of the ARB's 2003 Consumer and Commercial Products Survey (ARB, 2003). As shown in Table VI-21, aerosol General Purpose Degreasers have estimated VOC emissions of almost one ton per day (1,958 pounds per day) in California.

Table VI-21
General Purpose (aerosol) Degreasers*

Product Form	Number of Products	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Aerosol	103	4,240	1,958

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

As shown in Table VI-21 this category contains 103 products with sales of 4,240 pounds per day. The sales weighted average VOC content is about 46 percent.

Product Use and Marketing:

The aerosol General Purpose Degreaser category includes a wide variety of products for use in household, automotive, and commercial settings. General Purpose Degreasers are used for degreasing a wide variety of surfaces in the household kitchen and garage, as well as commercial and institutional settings such as restaurants, hospital kitchens, automotive shops, machine shops, and many more janitorial and commercial settings. They can be used to wipe smooth surfaces such as walls or appliance surfaces to remove grease; they can also be used to degrease machine or equipment parts, or for removing grease from plumbing or pipe-fittings.

These products can be purchased through many sales outlets including grocery stores, discount stores, wholesalers, mass merchandisers, hardware stores, warehouse stores, and home centers. General Purpose Degreasers are also sold to industrial or institutional users through distributors or through direct sales by the manufacturer.

More detailed information on product use and marketing can be found in the "Initial Statement of Reasons for the Proposed Amendments to the Consumer Products Regulation," (Staff Reports) for the "Mid-term I Measure" Amendments and "Mid-term II Measure" Amendments (ARB, 1997; ARB, 1999).

Proposed VOC Limit and Compliance

The proposed VOC limit for aerosol General Purpose Degreasers is 10 percent by weight, effective December 31, 2008. As shown in Table VI-22, using adjusted 2003 emissions, the proposed limit will result in an estimated emission reduction of 1,394 pounds per day or 0.70 tpd.

Table VI-22 also shows that 3 percent of the market currently complies with the proposed 10 percent VOC limit for aerosol products. It should be noted that about one percent of the complying market share consists of products with at least one chlorinated ingredient. We are now aware of additional products that have been introduced to the California market and comply with the proposed 10 percent limit (Kyzen, 2006).

Table VI-22
General Purpose Degreasers (aerosol) Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Aerosol	10	21	3.1	1,394

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

The proposed 10 percent by weight VOC limit is largely based on results of a research project funded by ARB. The goal of the research was to demonstrate that technologies used to comply with the South Coast Air Quality Management District's (SCAQMD) Rule 1171 could be transferred, developed, and repackaged into low VOC and non-toxic aerosol automotive products. Rule 1171 limits the level of VOCs in solvent cleaning products to 25 grams per liter (Rule,1171).

In 2003, the Institute for Research and Technical Assistance (IRTA) with assistance from a Technical Review Committee (TRC) undertook the project. The TRC consisted of government agencies, environmental organizations, automotive repair shops and facilities, product formulators and manufacturers. Working with the TRC, IRTA was able to demonstrate effective aerosol automotive maintenance products, including General Purpose Degreasers. The products were used by technicians at several automotive maintenance facilities. Under these "real world" scenarios the technicians found the products to perform as well, or nearly as well as, existing products.

The IRTA Study was reviewed and approved by the Research Screening Committee. The Board's legislatively mandated Research Screening Committee consists of scientists, engineers, and others knowledgeable, technically qualified, and experienced in air pollution problems. The Committee meets approximately four times a year to review proposed and completed research projects.

The products that performed well had no more than 10 percent VOC by weight. Products that were effective were based on the following technologies: LVP-VOC (including methyl esters), alkaline cleaning, surfactant, and/or exempt VOC solvents. Typical propellants that were effective at delivering the products were hydrocarbons or carbon dioxide. To meet the proposed 10 percent VOC limit, we expect products to use these technologies. The findings from the IRTA project are consistent with ARB staff's research on available reformulation technologies.

Issues:

1. Issue: The proposed VOC limit is not technologically or commercially feasible for most General Purpose Degreasers.

Response: Survey data show that there are products currently able to meet the limit. As explained in the "Proposed VOC Limit and Compliance" section, ARB contracted with IRTA to show that non-toxic, low VOC alternatives can be formulated at the proposed limit and perform comparably to existing products.

2. Issue: ARB staff should not use the IRTA study as proof of low VOC capability because the study is flawed in concept and execution.

Response: ARB staff disagrees with the comment. The draft final report was reviewed and approved by ARB's Research Screening Committee, a panel of independent, distinguished scientists. ARB staff is also aware of products recently introduced to the market, and other products about to be introduced to the market that already comply with the proposed 10 percent VOC limit.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2003)

2. Air Resources Board. Final Statement of Reasons, Public Hearing to Consider the Airborne Toxics Control Measure for Emissions of Chlorinated Toxic Air Contaminants from Automotive Maintenance and Repair Activities. August 27, 2000. (ARB, 2000)

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

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

5. Institute for Research and Technical Assistance (IRTA). Safer Alternatives to Solvent Aerosol Automotive Products. December, 2004. (IRTA, 2004)

6. Kyzen Corporation. Product Bulletin: Kyzen Cyber Solv. September, 2006. (Kyzen, 2006)

L. Laundry Starch/Sizing/Fabric Finish Product

Product Category Description:

Products in the "laundry starch/sizing/fabric finish product" category are designed to impart a crisp, fresh look to fabric articles, and to make ironing easier. In addition, the products may also help the fabric resist soiling, make laundering easier, and may extend the life of the fabric. Starch products are generally used for cotton fabric, while sizing/fabric finish products are generally used for synthetic fabrics. Some sizing/fabric finish products may also be suitable for cotton. Products in the "laundry starch/sizing/fabric finish product" category are applied to fabric articles either during or after laundering. The non-aerosols (liquids and dissolved solids) are used in washing machines or by hand-rinse, while the aerosols are manually applied during the ironing process (ARB, 1991b; SDA 2006).

Laundry starch/sizing/fabric finish products were regulated under Phase II of the Consumer Products Regulation adopted on January 9, 1992, and a description of these products is also included in the staff report for that item. At that time, the Board adopted as staff had recommended, a 5 percent VOC limit for these products, applicable to all product forms (i.e. both aerosol and non-aerosol), which was effective on January 1, 1995 (ARB, 1991b; ARB, 1992, FSOR).

Table VI-23 below summarizes the sales and emissions from laundry starch/sizing/fabric finish product, based on the results of the ARB's 2003 Consumer and Commercial Products Survey (ARB, 2003). As shown in Table VI-23, the aerosol form was the main contributor of VOC emissions, while the non-aerosol products, with very low VOC content, dominated product sales by weight.

Table VI-23
Laundry Starch/Sizing/Fabric Finish Product *

Product Form	Number of Products	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Aerosol	14	46,600	2,220
Non- Aerosol	34	1,119,000	14
Total	48	1,166,000	2,230

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

Product Use and Marketing:

Products in the “laundry starch/sizing/fabric finish product” category are used by both household consumers and commercial/institutional users. While the aerosol products are mainly used by household consumers, the non-aerosol products are mainly used by the commercial/institutional users (ARB, 2003). The commercial/institutional laundries include laundries serving individual or business customers, and in-house laundries within businesses and institutions.

The aerosol products are sprayed onto cleaned laundry, followed by ironing of the fabric to smooth the fabric and set the starch or finish. The aerosol can is designed for optimum operation when positioning up to approximately 45 degrees from vertical, for spray application to articles placed on an ironing board or table. (Faultless, 2006a)

The non-aerosol products are liquid or solid products used in commercial/institutional washing machines. Products are typically applied to laundry by a dispensing mechanism.

For consumer hand washing, non-aerosol products may be applied to laundry using a small basin.

Products are sold in supermarkets, general merchandise stores, drug stores, hardware stores, maintenance/laundry supply warehouses, and through the internet. The aerosol products are typically sold alongside other laundry products, such as detergent and fabric softener, to household consumers. Non-aerosol products are similarly available. For commercial and institutional laundry operators, non-aerosol products are available in bulk quantities, either in dry (solid) or liquid form.

Product Formulation:

Laundry starch products are typically composed of modified vegetable starch (corn, but also rice or wheat), an ironing aide such as silicone, surfactant (wetting agent), water, and for aerosol products -- hydrocarbon propellant and rust inhibitor. Other ingredients used, for cosmetic appeal, include bluing agents, optical enhancers, and fragrance. Borax may be used to reduce scorching from the hot iron. Besides easing ironing, the silicones may also reduce material buildup on the iron soleplate. The starch products are absorbed and bind to fabrics of natural fibers such as cotton, linen, and cotton blends. The propellant in aerosol products consists of conventional liquefied hydrocarbon gases (SCA 2006; Schiff, 2006; ARB 2003).

Since starch does not bind well to synthetic fabrics or blended fabrics with a high synthetic content, other ingredients are used in the sizing/fabric finish products to facilitate binding. Sodium carboxymethylcellulose is a common binding agent ingredient used in aerosol products. Polyvinyl acetate (PVA) is also used in sizing/fabric finish. PVA mainly attaches to the outside surface of synthetic fibers and is not absorbed. Sizing/fabric finishes were developed for fabric blends and polyesters with tighter

weaves, special finishes, and the need to replace the "sizing" in the fabric when new. Sizing refers to closing the pores of fabrics by covering the surface. Compared with sizing products, fabric finish products may provide a heavier finish (SDA 2003; Schiff, 2006; Faultless, 2006b; ARB, 1991b).

Essentially all VOC emissions in this category are due to the hydrocarbon propellants, used only in the aerosol products.

Proposed VOC Limit and Compliance:

The proposed VOC limit for "laundry starch/sizing/fabric finish product" is 4.5 percent by weight for all product forms, effective December 31, 2008. As shown in Table VI-24, using adjusted 2003 emissions, the proposed limit will result in an estimated emission reduction of 120 pounds per day or 0.06 tons per day.

Table VI-24 also shows that 0.6 percent of the aerosol market currently complies with the proposed 4.5 percent VOC limit. Since all non-aerosol products comply, and all are substantially below the proposed 4.5 percent VOC limit, they will not be affected by the proposal, will not need any reformulation, and will provide no emission reduction.

Table VI-24
Laundry Starch/Sizing/Fabric Finish Product Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Aerosol	4.5	2	0.6	120
Non-Aerosol	4.5	34	100	None
Total (All)				120

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

As previously discussed, the hydrocarbon propellant in the aerosol products contributes essentially all of the VOC emissions from this category. The proposed 4.5 percent VOC limit is designed to minimize the amount of hydrocarbon propellants used, while still allowing for adequate aerosol spray function. Adequate spray function includes production of a suitable spray pattern without actuator/valve clogging, "sputtering," or dripping problems, and having sufficient propellant to empty the product from the container. Two products reported in the 2003 survey, representing 0.6 percent of the aerosol market, comply with the proposed 4.5 percent VOC limit. This indicates that a 4.5 percent hydrocarbon propellant content, and hence a 4.5 percent VOC limit, is sufficient for aerosol performance. With the proposal, we also believe that the use of much more expensive substitute propellants, such as HFC-152a (exempt), is not necessary.

Issues:

1. Issue: A 0.6 percent complying market share for the aerosol products, as reported in the 2003 survey, does not support the (originally) proposed limit of 4 percent VOC. Historical data show a product category with a declining market and declining VOC emissions. The current 5 percent VOC limit allows just enough propellant to empty the container. A lower VOC limit would also increase problems with clogged valves.

Response: While the complying market share is relatively low, it is only one of various considerations used to determine commercial and technical feasibility. Within this category for example, there are two distinct aerosol products, reported in the 2003 survey, that do comply with the (originally) proposed 4 percent VOC limit. To help minimize problems concerned with emptying the container and clogged valves, we have raised the proposed VOC limit to 4.5 percent. While sales may be declining, this category is still important with substantial sales remaining. We believe the proposal is commercially and technologically feasible, through adjustment of the aerosol products to accommodate less hydrocarbon propellant, and with more comprehensive public education about product use.

2. Issue: A requirement to reduce the level of propellants in aerosol products will result in more customer complaints, concerning failure to empty the can and with actuator/nozzle clogging.

Response: We understand the desire to include enough propellant to help offset customer misuse, and to reduce customer complaints. We have accordingly raised the proposed VOC limit to 4.5 percent. It may also be necessary to adjust the actuator/valve dimensions to accommodate the new formulation containing less propellant.

3. Issue: For aerosol products, the ARB should consider a VOC limit of 4.5 percent.

Response: After further consideration, we have raised the VOC limit, as requested. See Responses 1 and 2 above.

4. Issue: The non-aerosol products should be regulated with the aerosol products, and not separately regulated. There is little or no reduction potential in establishing a separate limit for this form.

Response: We do not intend to separate the non-aerosol products from the aerosol products in terms of the VOC limit, which is to remain one limit for “all product forms.” We presented data separately for the non-aerosols and aerosols for informational purposes, because combining the data would be very misleading. With

the proposal as discussed above, from the non-aerosols there is no need for the non-aerosols to reformulate and no emission reduction expected.

5. **Issue:** Regarding the category definition, the words "designed for" should be removed, since all products labeled for the uses in this category are designed for those uses.

Response: We agree that the words "designed for" are not needed and should be removed. For clarification, we have replaced the words "designed for" with the words "labeled for."

REFERENCES

1. 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, 1991b)

2. 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)

3. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2003)

4. Faultless Starch / Bon Ami Company. "Six Steps To Spray Starch Success." "http://www.faultless.com/PDF/howTostarch2.pdf July, 24, 2006 (Faultless, 2006a)

5. Faultless Starch / Bon Ami Company. "The Faultless Fabric Care Handbook." (English) pp 7-9. http://www.faultless.com/fabric.htm July 21, 2006. (Faultless, 2000b)

6. Schiff, Nathan Ph.D. "All About Starch." http://www.schiff-consulting.com/LAUNDRYSTARCH.htm July 21, 2006. (Schiff, 2006)

7. The Soap and Detergent Association. "Facts About Laundry -- Types of Laundry Products." http://www.cleaning101.com/laundry/fact/fact_sheet4.html January 17, 2006. (SDA, 2006)

M. Oven Cleaner (non-aerosol)

Product Category Description:

Oven Cleaners are defined in the regulation as "any cleaning product designed to clean and to remove dried food deposits from oven walls." We are proposing to amend the definition for Oven Cleaner as follows: "Oven Cleaner" means any cleaning product labeled to clean soils or remove food deposits from oven walls or associated surfaces, including grills, drip pans, or oven racks. Oven Cleaner does not include products labeled exclusively to clean grills, microwave ovens, stovetops, or cooktops.

Results of the 2003 Survey indicate that many oven cleaners are designed for use on grills as well as ovens. However, products labeled only for grill cleaning were deferred from the 2003 Survey. As a result, grill cleaning only products are not included in this category. In addition, this category does not include products specifically used to clean microwave ovens, and/or stovetops/cooktops. After referencing the Technical Support Document for "Phase I" (ARB, 1990a), and evaluating product label claims and formulation data, we believe that products labeled to primarily clean soils from microwave ovens or stovetops/cooktops meet the definition of "General Purpose Cleaner," as defined in section 94508(a) of the Consumer Products Regulation.

Oven Cleaners were regulated under "Phase I" of the Consumer Products Regulation adopted in October of 1990. At that time, the Board adopted an 8 percent by weight VOC limit for aerosol and pump spray products and a 5 percent by weight VOC limit for liquids. The effective date for both VOC limits was January 1, 1993. In addition to amending the definition for "Oven Cleaner" to reflect the excluded products described above, we believe technology exists to further reduce VOC emissions from this category. We also have found that technology exists such that "pump spray" Oven Cleaners no longer require a higher VOC limit than "liquid" Oven Cleaners. Because we believe that "non-aerosol" better describes the "pump spray" and "liquid" product form, we intend to modify the Table of Standards, as set forth in section 94509(a), to reflect this change.

Table VI-25 below summarizes the sales and emissions from non-aerosol (liquid and pump spray) Oven Cleaners based on the results of the ARB's 2003 Consumer and Commercial Products Survey (ARB, 2003). As shown in Table VI-25, non-aerosol Oven Cleaners (liquid and pump spray) emitted an estimated 0.3 tons per day of VOCs (510 pounds per day) in California in 2003.

Table VI-25
Oven Cleaner (non-aerosol)*

Product Form	Number of Products	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Liquid	76	13,660	326
Pump Spray	24	6,612	184
Total	100	20,272	510

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV).

As shown in Table VI-25, this category contains 76 liquid oven cleaning products with sales of 13,660 pounds per day. The sales-weighted average VOC content is about two percent for liquid Oven Cleaners. This category also contains 24 pump spray Oven Cleaners with sales of 6,612 pounds per day. The sales-weighted average VOC content for pump spray Oven Cleaners is about three percent.

Product Use and Marketing:

Oven Cleaners are used in homes, institutional facilities, and in commercial facilities, such as bakeries and restaurants. These products are used to clean and remove carbonized food and other soils and to maintain a safe and functional oven. Use of ovens that are not properly maintained can result in fires. While there are products designed specifically for cleaning ovens, an increasing number of consumers are routinely cleaning their grills, oven racks, drip pans, and other oven accessories with oven cleaners.

These products are sold through a variety of sales outlets including supermarkets, home centers, grocery stores, drug stores, and by mass merchandisers. Oven Cleaners are also sold to commercial or institutional users through distributors or through direct sales by the manufacturer.

Non-aerosol Oven Cleaners are usually applied by either pump spray or as a paste. Thickening agents are added to the liquid forms to promote adhesion of the cleaner to vertical oven surfaces. Most products suggest placing newspaper on the floor and warn against allowing the cleaner to contact painted surfaces. Some cleaners in this category direct users to preheat the oven prior to cleaning. However, most cleaners advise the users to turn off the oven and the pilot light prior to product application. After application, the product is generally allowed to “work” for up to 20 minutes before wiping off with a damp cloth.

Product Formulation:

Oven Cleaners consist of both caustic and non-caustic formulations. Caustic formulations typically contain potassium hydroxide or sodium hydroxide as the active agent, with surfactants such as sodium xylene sulfanate and solvents suspended in an emulsion. Solvents are commonly a glycol ether (2-butoxyethanol) and alcohol. The solvent's function is to solubilize grease and carbonized food deposits. This allows the caustic ingredient to penetrate the food soils to form soap, which is later wiped off with a damp cloth. Caustic formulations work with or without heat. The application of heat speeds up the reaction between the caustic ingredient and the fatty acids contained in grease deposits, resulting in a quicker cleaning process.

Non-caustic formulations require higher temperatures and usually contain ethanolamine/monoethanolamine, ethylene glycol ethers, or weak alkaline salt as the active ingredients. These formulations are lower in VOC content than the caustic ones (ARB, 1990a).

Proposed VOC Limit and Compliance:

The proposed VOC limit for non-aerosol Oven Cleaners is one percent by weight, effective December 31, 2008. As shown in Table VI-26, using adjusted 2003 emissions, the proposed limit will result in an estimated emission reduction of 188 pounds per day or 0.09 tons per day.

Table VI-26 also shows that over 25 percent of the market currently complies with the proposed one percent VOC limit for non-aerosol Oven Cleaners.

Table VI-26
Oven Cleaner (non-aerosol) Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Non-Aerosol	1	50	25.6	188

***** Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
****** Survey emissions adjusted for complete market coverage (see Chapter IV).

The proposed one percent VOC limit is designed to further reduce VOC emissions from this category. We expect manufacturers of non-complying products to reformulate using LVP-VOC glycol ethers such as diethylene glycol monobutyl ether or tripropylene glycol methyl ether in place of 2-butoxyethanol.

Issue:

1. Issue: Products designed specifically for cleaning grills should not be included in this category because “grill cleaners” were deferred from the 2003 Consumer Product Survey.

Response: We agree and are not proposing to include them in the Oven Cleaner category.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2003)

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

N. Sanitizer Category

Product Category Description:

Sanitizer is defined as any product that is registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA, 7 U.S.C. 136, et seq.) and is labeled to reduce, but not necessarily eliminate, microorganisms in the air, on surfaces, or on inanimate objects. “Sanitizer” includes food contact and non-food contact products. “Sanitizer” does not include (A) "Disinfectant,” (B) products labeled solely for use on humans or animals, (C) products labeled solely for agricultural use, (D) products, which are subject to a VOC limit under another regulated category in section 94509(a), as dictated by the primary use indicated on the principal display panel.

To make anti-microbial pesticide claims a sanitizer must be registered with the U.S. Environmental Protection Agency (U.S. EPA) according to FIFRA requirements and with the California Department of Pesticide Regulation. Sanitizers are designed to reduce pathogenic microorganisms to acceptable levels in the air and on surfaces. Surface sanitizers are applied after surfaces have been cleaned of any organic debris.

The Health and Safety Code 41712 (e)(1) directs the Air Resources Board to consider recommendations from health agencies (local, State, or federal) regarding regulation of health benefit products. This process was put in place to ensure that public health would not be compromised by regulating VOC content of such products. Because sanitizers are considered health benefit products, staff consulted with the California Department of Health Services (DHS) to discuss the proposed VOC limits and receive their expert advice as to whether adopting the proposed VOC limits would affect product efficacy. Staff is continuing to work with DHS staff to ensure that the proposed limits do not adversely impact the efficacy of Sanitizers.

Table VI-27 below summarizes the sales and emissions from sanitizers based on the results of the ARB's 2003 Consumer and Commercial Products Survey (ARB, 2003). As shown in Table VI-27, sanitizers are sold in both aerosol and non-aerosol forms, with the non-aerosol form dominating the market in terms of sales. However, the aerosol products contribute approximately 75 percent of the VOC emissions from this category. Sanitizers contribute about 1.9 tons of VOC emissions per day (3,760 pounds per day) in California. The sales weighted average VOC content for aerosol products is 93.3 percent by weight and 1.6 percent by weight for non-aerosol products, after the label specified dilution takes place.

Table VI-27
Sanitizers*

Product Form	Number of Products	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Aerosol	6	3,020	2,820
Non-aerosol	139	43,852	940
Total	146	46,872	3,760

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003) with 2005 updated sales for some aerosol products.

** Survey emissions adjusted for complete market coverage (see Chapter IV).

Product Use and Marketing:

The sanitizer category consists of aerosol and non-aerosol products. Generally, non-aerosol sanitizers are divided into food-contact and non-food contact surface sanitizers.

Most aerosol sanitizers are air sanitizers designed to reduce airborne bacteria. FIFRA requires performance tests based on the type of active ingredients in air sanitizers. For products that contain glycols (triethylene, dipropylene, or propylene glycol) efficacy requirements are met by the chemical formula statement showing 5 percent glycol content. For aerosol sanitizer products that contain active ingredients other than glycols (e.g. alcohol) testing must be performed using an air sampling device, to demonstrate 99.9 percent reduction of *Staphylococcus aureus* and *Klebsiella pneumoniae* in the air. If the product is intended for use in hospital or medical settings, tests with *Pseudomonas aeruginosa* are also required (U.S. EPA, 1980).

Additionally, many aerosol sanitizers make odor removal claims along with sanitizing claims. Aerosol sanitizers are used in hospitals, schools, offices, public buildings, and in homes.

Non-aerosol sanitizers are designed for use on surfaces. Surfaces must be cleaned of most organic matter, because organic matter may deactivate the active

ingredients (Maintenance, 2002). Most products are diluted, applied to a pre-cleaned surface and allowed to set for a specified amount of time (1 – 10 minutes based on the 2003 survey data), before wiping or rinsing. Sanitizers must remain on the surface for the specified contact time to be effective.

Food contact non-aerosol sanitizers are applied to surfaces where contact with food may occur. FIFRA requires all food-contact surface sanitizers to demonstrate a 99.999 percent reduction in the number of microorganisms within 30 seconds. The specific test organisms are *Escherichia coli* and *Staphylococcus aureus* (U.S. EPA, 1979).

Non food-contact non-aerosol sanitizers are typically applied to walls and floors. FIFRA requires all non food-contact surface sanitizers to demonstrate a 99.9 percent reduction in the number of microorganisms within 5 minutes. The specific test organisms are *Staphylococcus aureus* and *Klebsiella pneumoniae. Enterobacter aerogenes* may be substituted for *Klebsiella pneumoniae* (U.S. EPA, 1976).

Based on our 2003 survey data most of the non-aerosol sanitizers are liquid products that require dilution with water. Additional product forms include, foam, and mist spray dispensed via a non-pressurized system. Products requiring dilution must be diluted in accordance with label directions for effective sanitizing, which is also a FIFRA requirement (Maintenance, 2002).

Aerosol sanitizers are primarily sold to household consumers, whereas non-aerosol sanitizers are sold primarily to commercial, industrial, and institutional establishments. Sanitizers are sold at warehouse, janitorial, supermarket, hardware, and convenience stores.

Product Formulation:

The VOC ingredients in aerosol sanitizers are primarily ethanol, isopropanol and hydrocarbon propellants (propane, isobutane, and isopentane). The alcohols and glycols, such as triethylene glycol and propylene glycol comprise the active ingredients in aerosol formulations. (ARB, 2003) The glycols comprise some of the low vapor pressure (LVP-VOC) ingredients. Based on the 2003 survey data, the total VOC content of aerosol sanitizers ranges from 68.6 to 93.9 percent by weight.

The VOC ingredients in non-aerosol sanitizers are ethanol, isopropanol and 2-butoxyethanol (ARB, 2003). In addition to alcohols, quaternary ammonium compounds (quats) and phenolics comprise the active ingredients. The total VOC content of non-aerosol sanitizers ranges from 0 to 59 percent by weight. (ARB, 2003)

Proposed VOC Limit and Compliance:

The proposed VOC limits for sanitizers are 70 percent by weight for aerosol products, and 1 percent by weight for non-aerosol products, effective

December 31, 2008. To allow the time necessary for FIFRA registration requirements, the effective date of the VOC limits for sanitizers is one year after the date proposed, as specified in section 94509(d) of the Consumer Products Regulation. This means the effective date would be December 31, 2009. The sell-through period also starts one year after the proposed date, as specified in section 94509(d).

In consulting with medical experts in the field of public health and the industry that formulates these products we have determined that the proposed limits will ensure that products will achieve the same level of disinfection. Public health would not be compromised.

As shown in Table VI-28 the proposed limits for sanitizers will result in an estimated reduction of 1,584 pounds per day, or approximately 0.79 tpd.

Table VI-28 also shows that no products currently comply with the proposed 70 percent VOC limit for aerosol products and 92 percent of the market currently complies with the 1 percent limit for non-aerosol products. We also note that industry stakeholders, who manufacture these products, have agreed that the proposed VOC limits are achievable while maintaining equivalent efficacy to existing products. The VOC limit for the non-aerosol sanitizer is applied after the product is diluted, as specified on the label. When multiple dilutions are specified, the VOC limit would apply toward the highest concentrated product dilution.

Table VI-28
Sanitizer Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Aerosol	70	0	0	920
Non-aerosol	1	123	92	664
Total				1,584

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003) with 2005 updated sales for some aerosol products.

** Survey emissions adjusted for complete market coverage (see Chapter IV).

Reformulation options that could be used by manufacturers to meet the proposed VOC limit include:

(a) Reduction of alcohol level for both aerosol and non-aerosol forms.

(b) Changing the level of non-alcohol active ingredients, such as quaternary ammonium compounds and glycols, to help offset a reduction in alcohol.

(c) Reduction of VOC propellant level, and/or substitution of part or all of VOC propellant with non-VOC propellant (e.g. carbon dioxide).

The staff concludes that the proposed 70 percent limit for aerosol sanitizers and 1 percent limit for non-aerosol sanitizers would result in products that continue to provide the necessary air and surface sanitizing properties.

Issues:

1. Issue: These products must remain effective for all types of surfaces because they are health benefit products.

Response: ARB staff agrees and in accordance with State law, has consulted with the California Department of Health Services and the sanitizer industry to ensure that the proposed VOC limits are achievable while maintaining the same level of efficacy.

2. Issue: CSPA member companies manufacturing these important health-benefit products believe that the 70 percent and 1 percent limits proposed may be technologically and commercially feasible. Therefore CSPA supports adoption of 70 percent for aerosol form and 1percent for non-aerosol form VOC limits for this category.

Response: Comment noted. Staff agrees that the proposed limits are commercially and technologically feasible.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2003)

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

3. 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, 1991b)

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

5. 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)

6. Maintenance Supplies. "Term-inate Germs in the Restroom." Volume 47 No. 08, pp. 22-24. August, 2002. (Maintenance 2002)

7. U.S. Environmental Protection Agency. "Sanitizer Test for Inanimate Non-Food Contact Surfaces: Efficacy Data Requirements." DIS/TSS-10 http://www.epa.gov/oppad001/dis_tss_docs/dis-10.htm, 1976. (U.S. EPA, 1976)

8. U.S. Environmental Protection Agency. "Sanitizing Rinses for Previously Cleaned Food-Contact Surfaces: Efficacy Data Requirements". DIS/TSS-4 http://www.epa.gov/oppad001/dis_tss_docs/dis-04.htm, January 30, 1979. (U.S. EPA, 1979)

9. U.S. Environmental Protection Agency. "Air Sanitizers: Efficacy Data and labeling Requirements." DIS/TSS-11 http://www.epa.gov/oppad001/dis_tss_docs/dis-11.htm, September 3, 1980. (U.S. EPA, 1980)

O. Temporary Hair Color

Product Category Description:

Temporary hair color products are labeled to apply a temporary layer of color or glitter to human hair or animal fur. This category includes glow-in-the-dark and black-light-activated products. These products are different from demi-permanent, semi-permanent, and permanent hair dyes because they are not intended to last for more than one shampoo or to penetrate the hair cuticle. Only the aerosol product form will be considered herein.

A closely related category, Hair Spray, was originally regulated under "Phase I" of the consumer products regulation adopted in October of 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 Tier I standard of 80 percent VOC, effective on January 1, 1993 and a Tier II standard of 55 percent VOC that ultimately became effective June 1, 1999 (ARB, 1997). Discussions between ARB staff and manufacturers prompted many aerosol temporary hair color manufacturers to change their labeling by removing style-finishing claims, in order to avoid being subject to the Hair Spray VOC limit. Indeed, at the time, many temporary hair color aerosol sprays made holding claims consistent with hair sprays' claims.

Table VI-29 below summarizes the sales and emissions from temporary hair color based on the results of the ARB's 2003 Consumer and Commercial Products Survey (ARB, 2003). Although temporary hair color is sold in many product forms, only the aerosol form was surveyed in this regulatory effort. Temporary hair color is responsible for estimated VOC emissions of about 0.30 tons per day (592 pounds per day) in California.

Table VI-29
Temporary Hair Color

Product Form	Number of Products	Category Sales (lbs/day)	Adjusted VOC Emissions (lbs/day)**
Aerosol	30	624	592

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).

** Survey emissions adjusted for complete market coverage (see Chapter IV). The market coverage adjustment for temporary hair color was 25 percent; staff believes the survey covered 75 percent of the market.

Product Use and Marketing:

Aerosol temporary hair color is applied by holding the container 6-10 inches away and spraying dry, styled hair with short bursts of spray until the desired coverage is achieved. Most labels direct the user to apply temporary hair color only after styling, and warn against further heat styling after application. To remove the products, label instructions suggest combing through the hair to remove as much of the product as possible, then shampooing as usual. Some labels warn that staining may occur on blonde or white hair.

One foaming aerosol mousse product was reported in the 2003 Survey, and is used similarly to the aerosol sprays.

Temporary hair color aerosols are commonly used as novelty products by general consumers for holidays or special occasion costumes, by nightclubbers or partygoers, by thespians, and by sports fans. They are also used by pet owners to enhance the color of their pet's coat, perhaps prior to a show or competition.

Temporary hair color products are sold in a variety of retail outlets, including: mass-merchandiser retail chain stores, beauty supply stores, costume shops, novelty shops, party supply stores, seasonal specialty shops (such as shops only open for the Halloween season) and the Internet. While sales for these products peak near Halloween, they are available, purchased, and used year-round.

Product Formulation:

Temporary hair color aerosol formulas are typically quite similar to hair spray formulas used prior to the adoption of VOC standards for Hair Spray. The products are typically composed of propellant, ethanol, and resins or polymers, just like hair sprays. The color products, however, contain a small percentage of pigments or glitter in addition to the other components.

Proposed VOC Limit and Compliance:

The proposed VOC limit for the aerosol form of Temporary Hair Color, is 55 percent by weight, effective December 31, 2010. As shown in Table VI-30, using adjusted 2003 emissions, the proposed limit will result in an estimated emission reduction of 250 pounds per day or 0.13 tons per day.

The percent complying market share has been withheld from Table VI-30 to protect the confidentiality of the one aerosol mousse product that is currently compliant with the proposed limit. None of the reported aerosol temporary hair color sprays are currently compliant with the proposed limit. A similar situation occurred when the 55 percent limit for Hair Spray was proposed.

Table VI-30
Temporary Hair Color Proposal*

Product Form	Proposed VOC Limit (wt. %)	Complying Products	Complying Market Share (%)	Emissions Reductions (lbs/day)**
Aerosol	55	1	***	250

* Based on 2003 Consumer and Commercial Products Survey (ARB, 2003).
** Survey emissions adjusted for complete market coverage (see Chapter IV). The market coverage adjustment for temporary hair color was 25 percent; staff believes the survey covered 75 percent of the market.
*** Data withheld to protect confidentiality.

Manufacturers could comply with the limit by using exempt propellants, or changing to water-based formulations with water-compatible propellant and resin systems, two options that have been used to successfully formulate compliant hair sprays. Aerosol temporary hair color products currently use resins such as PVP/VA copolymer, which was a popular resin system in hair sprays prior to the adoption of lower VOC standards in the early 1990s, and is still used in some compliant hair spray formulations today. Another popular resin in aerosol temporary hair colors, polyvinylcaprolactam, is also mentioned for use in 55 percent VOC hair spray formulations in manufacturer's technical bulletins (BASF). In general, hair sprays have shifted to octylacrylamide/acrylates/butylaminoethyl methacrylate copolymer, amongst others, in 55 percent VOC formulations. Based on the similarities between temporary hair color aerosols and hair spray formulations prior to VOC regulations, it is assumed that temporary hair color aerosols could follow similar reformulation pathways.

Issue:

1. Issue: Changing polymer/solvent systems and propellant systems will require significant time and effort to accomplish effectively. Please consider delaying the effective date to allow for these transitions.

Response: Staff acknowledges these challenges and, therefore, proposes an effective date of December 31, 2010.

REFERENCES

1. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2003)

2. Air Resources Board, Staff Report. Proposed Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products: Phase I. August, 1990. (ARB, 1990a)

3. Air Resources Board, Final Statement of Reasons for Rulemaking, Including Summary of Comments and Agency Responses: Public Hearing to Consider the Adoption of Amendments Pertaining to Hairspray in the California Consumer Products Regulation. March 1997. (ARB, 1997)

4. BASF. BASF Cosmetic Solutions: Styling polymers/hair setting resins. http://www.cosmetics.basf.de/formulation_detail.aspx?GrpID=29&FID=01_00972 p. 11. (BASF)

VII.

ECONOMIC IMPACTS

A. INTRODUCTION

This Chapter discusses the estimated economic impacts we anticipate from implementation of the 18 proposed new VOC limits (there are 15 categories; 18 limits when subcategories and form specific limits 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;
- **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;
- **G.** Other Possible Economic Impacts; and
- **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 Administrative Procedure Act (APA). This analysis uses similar methodologies and assumptions as were used in the last three major consumer products rulemakings, the “Mid-Term Measures” regulations adopted by the Board in 1997, 1999, and in the 2004 Amendments to the regulation. We have used updated methodologies to determine the high cost estimates for nonrecurring costs similar to the procedure we used in the 2004 Amendments. We have determined a likely high cost scenario specific to each category. See Subsection F of this Chapter for a detailed description of the nonrecurring cost determination methodology. The analysis, both here and in the 1997, 1999, and 2004 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 a low of 1.1 to a high of about 4.9 percent, with an average change in ROE of about 3.4 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.

Our analysis shows that the cost-effectiveness of the proposed amendments are 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 $2.35 per pound of VOC reduced.

We estimate that the total cost incurred by industry to comply with this regulation is about $20 million per year. 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 $0.44 per unit. The value of $0.44 represents the maximum, worst case per-unit cost increase. Again, this range compares favorably to the change in per unit cost projected for the Phase I and II, the Mid-Term Measures I and II regulations and the 2004 Amendments. The analysis assumed the present cost for raw materials; these costs may be lower or higher at the time of the limit effective date depending on the formulations chosen by manufacturers and the future price of raw materials. 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 nonrecurring 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 nonrecurring and annual recurring costs range from negligible cost (net savings or no cost) to about $2.27 per unit. The value of $2.27 represents the maximum, worst case, per-unit cost increase for a product which is typically packaged in a five gallon container. When averaged over the total number of unit sales in California of noncomplying products, (those that need to reformulate) the product weighted average cost increase is about $0.06 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

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 must 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 Innovative Product Provision (IPP) and the Alternative Control Plan (ACP) Regulation (see Subsection H of this Chapter). 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.

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 Dun and Bradstreet Industry Norms and Key Business Ratio, the ARB's 2003 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 2003 Survey, there are over 226 companies that 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 1,051 complying and 1,046 noncomplying products (based on reported figures). Of the companies manufacturing these products, about 49 firms (mostly medium- or small-sized firms) are located in California.

These 226 companies fall primarily into 5 North American Industry Classification System codes (NAICS). A list of these industries which we have been able to identify is provided in Table VII-1. The industries with the most noncomplying products are Soap and Other Detergent Manufacturing, Polish and Other Sanitation Good Manufacturing, Toilet Preparation Manufacturing and All Other Miscellaneous Chemical Product and Preparation Manufacturing.

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

NAICS*	Industry	Number of Product Categories*	Number of Noncompliant Products**	Includes:
325520	Adhesive Manufacturing	1	34	Construction, Panel and Floor Covering Adhesive
325611	Soap & Other Detergent Manufacturing	2	94	General Purpose Cleaner; Laundry Starch Product
325612	Polish & Other Sanitation Good Manufacturing	7	622	Bath and Tile Cleaner; Disinfectants; Floor Polish and Wax (flexible and nonresilient); Furniture Maintenance Product; General Purpose Degreaser; Oven Cleaner; Sanitizer
325620	Toilet Preparation Manufacturing	1	28	Temp. Hair Color
325998	All Other Miscellaneous Chemical Product & Preparation Manufacturing	4	268	Brake Cleaner; Carb Cleaner; Automotive Windshield Washer Fluid; Engine Degreaser

*As reported in the 2003 Consumer and Commercial Products Survey.
** Some noncomplying products may relate to more than one NAICS code.

Study Approach

This study covers 5 industries with at least 226 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 product category was selected from the Survey respondents.
(2) A range of compliance costs were estimated for each affected product category. The mid-range cost for each category was used in this analysis.
(3) Compliance cost to a typical business was then estimated based on a weighted average of all product category costs in an affected industry.
(4) Estimated cost was adjusted for federal and State taxes.
(5) 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 ROE. The adjusted ROE was then compared with the ROE before the subtraction of the 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; ARB 2004). This threshold is consistent with the thresholds used by the U.S. EPA.

Assumptions

This study uses 2003-2004 Dun and Bradstreet financial data for a nationwide typical business in each affected industry except for Polish and Other Sanitation Good Manufacturing where 1999-2000 Dun and Bradstreet financial data was used due to lack of relevant financial data. This data was used to calculate the ROEs before and after the subtraction of the compliance costs for a typical business in each industry listed in Table VII-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 $940 (low cost for typical non-aerosol Sanitizer manufacturer) to about $68,000 per year (high cost for typical Carburetor or Fuel-Injection Air Intake Cleaner manufacturer,) as shown in Table VII-2.

Table VII-2
Estimated Total Impacts to Businesses from Both Annualized Nonrecurring and Annual Recurring Costs

Table VII-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			For All Businesses in the Product Category		
			Low Cost	High Cost	Mid Cost	Low Cost	High Cost	Mid Cost
Adhesives								
Construction, Panel, and Floor Covering Adhesive	38	11	$1,078	$8,961	$5,020	$11,861	$338,518	$175,190
Total	38					$11,861	$338,518	$175,190
Automotive								
Brake Cleaner								
Aerosol	77	51	$2,116	$27,928	$15,022	$107,903	$2,141,140	$1,124,522
Non-aerosol	24	14	$2,457	$32,438	$17,448	$34,404	$792,929	$413,667
Automotive Windshield Washer Fluid (Type A)	29	22	$1,848	$1,848	$1,848	$40,659	$53,391	$47,025
Carburetor or Fuel-Injection Air Intake Cleaners								
Aerosol	100	43	$27,228	$68,232	$47,730	$1,170,783	$6,823,209	$3,996,996
Non-aerosol	20	12	$13,220	$41,539	$27,380	$158,643	$830,789	$494,716
Engine Degreaser (aerosol)	48	34	$1,978	$26,107	$14,042	$67,244	$1,247,312	$657,278
Total	298					$1,579,637	$11,888,770	$6,734,203
Household Care								
Bathroom & Tile Cleaner (non-aerosol)	81	54	$3,317	$3,317	$3,317	$179,141	$269,080	$224,111
Disinfectant	0							
Aerosol	43	30	$970	$5,755	$3,362	$29,087	$249,377	$139,232
Liquid	82	37	$1,059	$6,688	$3,873	$39,168	$549,929	$294,548
Floor Polish or Wax (flexible)	212	41	$7,285	$57,496	$32,391	$298,689	$12,201,974	$6,250,331
Floor Polish or Wax (nonresilient)	61	29	$2,966	$23,407	$13,187	$86,010	$1,430,456	$758,233
Furniture Maintenance Product (non-aerosol)	33	25	$3,794	$14,618	$9,206	$94,841	$487,272	$291,057
General Purpose Cleaner (aerosol)	91	58	$1,497	$8,067	$4,782	$86,804	$735,024	$410,914
General Purpose Degreaser (aerosol)	91	50	$7,499	$41,220	$24,360	$374,967	$3,755,645	$2,065,306
Laundry starch product/ sizing/ fabric finish (aerosol)	13	8	$3,681	$3,681	$3,681	$29,448	$49,080	$39,264
Oven or Grill Cleaner (non-aerosol)	62	28	$1,010	$6,544	$3,777	$28,293	$407,180	$217,737
Sanitizer	0							
Aerosol	7	2	$1,913	$11,656	$6,785	$3,825	$77,710	$40,767
Non-aerosol	18	9	$941	$5,945	$3,443	$8,469	$105,692	$57,080
Total	796					$1,258,742	$20,318,419	$10,788,580
Personal Care								
Temporary Hair Color (aerosol)	107	30	$4,850	$34,183	$19,516	$145,507	$3,646,146	$1,895,826
Total	107					$145,507	$3,646,146	$1,895,826
Grand Total	1238					$2,995,746	$36,191,853	$19,593,800

Using ROE to measure profitability, we found that the average ROE of sample businesses in affected industries declined by about 3.4 percent as shown in Table VII-3. This represents a minor change in the average profitability of typical businesses in California.

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

NAICS*	Industry	% Change in ROE
325520	Adhesive Manufacturing	1.1
325611	Soap & Other Detergent Manufacturing	4.3
325612	Polish & Other Sanitation Good Manufacturing	4.9
325620	Toilet Preparation Manufacturing	1.8
325998	All Other Miscellaneous Chemical Product & Preparation Manufacturing	4.7
Average		**3.4**

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 VII-3, the projected change in profitability of typical businesses in the 5 affected industries varied widely. Within the NAICS shown, the predicted change (decline) in profitability of a typical business ranged from a high of about 4.9 percent to a low of 1.1 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 typical businesses in each affected industry ranged from a high of approximately $22,000 to a low of about $4,600. Second, the performance of businesses may differ from year to year. Hence, the financial data used may not be representative of an average-year performance for some businesses.

The potential impacts to businesses' ROEs may be overestimated 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, nonrecurring costs were allocated to all products in the category, i.e., the costs were spread out over all complying and noncomplying products

that were reported in the survey. In this analysis, as in 2004, we allocated nonrecurring reformulation costs only to the noncomplying 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 will 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 $0.17 per unit. Product price increases, however, would vary from industry to industry. They would range from a low of $0.03 per unit of the products sold by Adhesive Manufacturing to a high of about $1.57 per unit of the products sold by Toilet Preparation Manufacturing.

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 satisfy consumers. 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 the U.S. Department of Commerce, California employment in industries affected by the proposed measures was 15,359 in 2003, as shown in Table VII-4, or about 9.7 percent of national employment in the affected industries. This represents about 0.1 percent of non-farm employment in California. These employees working in the 526 establishments generated about $676

million in payroll, or about 9.2 percent of national payroll in the affected industries. This also accounts for about 0.1 percent of the total California non-farm payroll in 2003.

Table VII-4
California Employment and Payroll in Affected Industries

NAICS	Number of Employees		Payroll	
	California	CA Share as % of US	California (million in 2003$)	CA Share as % of US
325520	2,078	9.9	113,760	11.3
325611	1,980	8.0	74,873	6.8
325612	1,169	6.2	45,478	5.7
325620	7,678	13.0	331,623	12.2
325998	2,454	7.0	675,801	6.5
Total	15,359	9.7	675,801	9.2

Source: 2003 County Business Patterns: The U.S. Department of Commerce, Bureau of the Census.

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 H).

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

We have identified one State agency that could be affected by the proposed new limits. The California Prison Industry Authority (PIA) manufactures and markets consumer products for use in State service. This is the only agency we are aware of that makes consumer products. The PIA manufactures a liquid disinfectant concentrate, which will be subject to the proposed one percent limit for non-aerosol disinfectants. This product meets the proposed new limit for non-aerosol disinfectants. The PIA also sells bar soaps, powder bleaches, liquid glass cleaners, liquid multipurpose cleaner and degreasers, and liquid and powder detergents (PIA, 2006). The proposed measures do not affect these categories and, as such, will not have an impact on the PIA. Based on the above, 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 nonrecurring 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 nonrecurring 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)

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

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 F, 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 18 product categories/subcategories, based on sales data and the speciated formulations as reported by manufacturers in the ARB's 2003 Consumer and Commercial Products Survey. To the extent feasible, we then determined the detailed formulations that most closely reflect the "typical" compliant and noncompliant 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 2006). Costs for other ingredients were obtained from discussions with chemical suppliers, 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. Inorganic compounds were assigned a low and high cost of $0.09 and $0.91 per pound based on the costs found of the most common inorganic compounds found in the product categories. Other 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 F 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-VII, 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 12.2 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. 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. We have received significant comments regarding our assumptions for fixed costs from specific interested parties. We worked

with these industry representatives to obtain new, updated, substantiated fixed cost data. The information we received generally confirms our cost assumptions to be correct. We therefore developed estimates for the nonrecurring costs based on analogous costs reported by ARB staff for the Phase II consumer products rulemaking (*Id*, Appendix D1). The Phase II nonrecurring costs are applicable for this analysis since they were based on staff's detailed estimates of labor, research and development, equipment purchase, and other costs involved in product reformulations for generic household, automotive, and personal care categories, all of which are impacted by proposed limits. This is the same approach we used for the 1997 Mid-Term Measures rulemaking, the 1999 Mid-Term Measures II rulemaking and the 2004 rulemaking.

The Phase II nonrecurring investment costs, reported in 1991 dollars, were adjusted to 2005 dollars using a well-established method of ratioing chemical engineering plant cost indices as follows (Peters and Timmerhaus, 1980):

$$Non-Recurring\,Costs\ (in\ 2005\ dollars) = \frac{Non-Recurring\ Costs\ (in\ 1991\ dollars)}{10} \times \frac{C.E.\ 2005\ Index}{C.E.\ 1991\ Index} \quad (4)$$

where,

C.E. 2005 index = 2006 Chemical Engineering Plant Cost Index = 480.7 (*Chemical Engineering*, February 2006).

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 nonrecurring costs for Phase II by a factor of ten (ARB, 1999, op cit. at Vol II, Chapter VII, Page 211). We therefore estimated the nonrecurring costs for the proposed new limits by adjusting the Phase II estimates to be consistent as shown in Equation (4).

Table VII-5 shows our estimates for per-product and total annualized nonrecurring costs for each of the 18 product categories/subcategories subject to the proposed limits. As shown, we project a per-product annualized nonrecurring cost ranging from a low of about $2,000 to a high of about $124,000. With over 1,000 noncompliant products that would need to be reformulated, the overall total annualized fixed cost to industry is projected to range from about $1.6 million to just over $12.6 million dollars per year, with a general breakdown of this range as follows: automotive care products (40 percent), household care products (51 percent), personal care products (8 percent) and adhesives (1 percent).

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 $2.35 per pound of VOC reduced.

It should be noted that a contributing factor to the total average cost per pound of VOC reduced is that the VOC emission reductions achieved from some of the proposed limits specific to individual categories may 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.

Table VII-5
Estimated Total Nonrecurring Fixed Costs to Comply with Proposed Limits

Table VII-5. Estimated Total Annualized Non-Recurring Fixed Cost to Comply with Proposed Standards

Category	Proposed Limit	Market Covered (% covered by 2003 Survey)	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										
Construction, Panel, and Floor Covering Adhesive	7	90	1.11	38	$1,929	$16,032	$314	$2,609	$11,861	$98,569
			Sum	38					$11,861	$98,569
Automotive										
Brake Cleaner										
Aerosol	10	90	1.11	77	$8,648	$114,155	$1,407	$18,578	$107,903	$1,424,324
Non-Aerosol	10	90	1.11	24	$8,648	$114,155	$1,407	$18,578	$34,404	$454,132
Automotive Windshield Washer (Type A)	25	90	1.11	29	$8,648	$8,648	$1,407	$1,407	$40,659	$40,659
Carburator or Fuel-Injection Intake Cleaners										
Aerosol	10	90	1.11	100	$8,648	$114,155	$1,407	$18,578	$140,743	$1,857,814
Non-Aerosol	10	90	1.11	20	$8,648	$114,155	$1,407	$18,578	$28,149	$371,563
Engine Degreaser (aerosol)	10	90	1.11	48	$8,648	$114,155	$1,407	$18,578	$67,244	$887,622
			Sum	298					$419,103	$5,036,114
Household Care										
Bathroom & Tile Cleaner (non-aerosol)	1	90	1.11	81	$13,571	$13,571	$2,209	$2,209	$179,141	$179,141
Disinfectant										
Aerosol	70	90	1.11	43	$4,124	$24,481	$671	$3,984	$29,087	$172,645
Non-aerosol	1	90	1.11	82	$2,927	$18,494	$476	$3,010	$39,168	$247,468
Floor Polish or Wax (flexible)	1	90	1.11	212	$8,648	$68,253	$1,407	$11,108	$298,689	$2,357,345
Floor Polish or Wax (nonresilient)	1	90	1.11	61	$8,648	$68,253	$1,407	$11,108	$86,010	$678,817
Furniture Maintenance Product (non-aerosol)	3	90	1.11	33	$10,378	$42,176	$1,689	$6,864	$56,297	$228,798
General Purpose Cleaner (aerosol)	8	90	1.11	91	$5,854	$30,335	$953	$4,937	$86,804	$449,802
General Purpose Degreaser (aerosol)	10	90	1.11	91	$13,571	$124,266	$2,209	$20,224	$201,227	$1,842,609
Laundry starch product/ sizing/ fabric finish (aerosol)	4.5	90	1.11	13	$13,571	$13,571	$2,209	$2,209	$29,448	$29,448
Oven or Grill Cleaner (non-aerosol)	1	90	1.11	62	$2,794	$18,094	$455	$2,945	$28,293	$183,231
Sanitizer										
Aerosol	70	90	1.11	7	$3,526	$21,487	$574	$3,497	$3,825	$23,313
Non-Aerosol	1	90	1.11	18	$2,927	$18,494	$476	$3,010	$8,469	$53,507
			Sum	796					$1,046,458	$6,446,123
Personal Care										
Temporary Hair Color (aerosol)	55	75	1.33	107	$8,382	$59,073	$1,364	$9,614	$145,507	$1,025,479
			Sum	107					$145,507	$1,025,479

2006 Chemical Engineering Plant Cost Index =	480.7	(Final 2/06)	Discount Rate	10.00%	Grand Annual Total (dollars per year)	$1,622,928	$12,606,284
1991 Chemical Engineering Plant Cost Index =	361.3	(Final 1991)	Project Horizon, yrs	10			
			Cost Recovery Facto	0.16275			

* # Noncompliant Products = Market Adj. x (# Noncompliant Products in Survey)

** 100% of the market complies with standard

Table VII-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 2006 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 VII-6
Comparison of Cost-Effectiveness for ARB Consumer Product Regulations/Measures

Regulation/Control Measure	Cost-Effectiveness (Dollars per Pound VOC Reduced)
2006 Amendments (current proposal)	$2.35
2004 Amendments[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

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);
5 ARB, 1997.
6 ARB, 1995.
7 ARB, 1990.
8 ARB, 1991.
9 ARB, 1989a.
11 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* magazine (CMR, 2006), and chemical materials distributors 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. Other than compounds specifically requested, the 2003 Consumer Products Survey did not ask for specific ingredient details for exempt, fragrance, some low vapor pressure VOCs, and inorganic compounds. 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). However, inorganic compounds tend to be less expensive and using the default low and high cost would not give an accurate representation of inorganic compound cost. Therefore inorganic compounds were assigned a low and high cost of $0.09 and $0.91 per pound based on the costs found of the most common inorganic compounds found in the product categories. 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 reformulation was assumed for noncompliant 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 VII-7, the anticipated raw materials cost changes range from no cost (net savings or no cost) to about $0.44 increase per unit (for aerosol Carburetor or Fuel-Injection Air Intake Cleaner).

Table VII-7
Estimated Impacts to Raw Materials Cost Per Unit

Table VII-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						
Construction, Panel, and Floor Covering Adhesive	0.94	1.72	0.87	1.60	0.00	0.00
Automotive						
Brake Cleaner						
Aerosol	0.34	0.38	0.05	0.06	0.00	0.00
Non-aerosol	3.77	4.02	0.05	0.11	0.00	0.00
Automotive Windshield Washer Fluid (Type A)	2.46	2.73	0.59	0.66	0.00	0.00
Carburetor or Fuel-Injection Air Intake Cleaners						
Aerosol	0.47	0.49	0.91	0.93	0.44	0.44
Non-aerosol	0.28	0.30	0.57	0.59	0.29	0.29
Engine Degreaser (aerosol)	0.12	0.15	0.05	0.06	0.00	0.00
Household Care						
Bathroom & Tile Cleaner (non-aerosol)	0.09	0.29	0.03	0.09	0.00	0.00
Disinfectant						
Aerosol	0.47	0.51	0.37	0.41	0.00	0.00
Liquid	2.61	3.59	1.24	2.13	0.00	0.00
Floor Polish or Wax (flexible)	42.85	79.11	40.46	75.69	0.00	0.00
Floor Polish or Wax (nonresilient)	42.85	79.11	40.46	75.69	0.00	0.00
Furniture Maintenance Product (non-aerosol)	1.58	2.64	1.66	2.93	0.08	0.29
General Purpose Cleaner (aerosol)	0.07	0.08	0.07	0.09	0.00	0.01
General Purpose degreaser (aerosol)	0.86	0.92	1.03	1.13	0.17	0.21

Table VII-7
Estimated Impacts to Raw Materials Cost Per Unit (continued)

Table VII-7. Estimated Impacts to Raw Materials Cost Per Unit (continued)

Category	Estimated Raw Material Costs, $/Unit of Product					
	Baseline Pre-Regulatory		Compliant		Baseline Pre-Reg	
	Low (A0)	High (B0)	Low (A1)	High (B1)	to Low (A1)-(A0)	to High (B1)-(B0)
Laundry starch product/ sizing/ fabric finish (aerosol)	0.19	0.34	0.18	0.34	0.00	0.00
Oven or Grill Cleaner (non-aerosol)	1.36	1.55	0.97	1.14	0.00	0.00
Sanitizer						
Aerosol	0.42	0.44	0.22	0.24	0.00	0.00
Non-aerosol	1.28	2.18	0.03	0.04	0.00	0.00
Personal Care						
Temporary Hair Color (aerosol)	0.18	0.22	0.14	0.20	0.00	0.00
					Min Increase	0.00
					Max Increase	0.44

Table VII-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 VII-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)
2006 Amendments (current proposal)	$0.00 to $0.44
2004 Amendments[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 Nonrecurring 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 nonrecurring 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 was done to comply with the 55 percent VOC limit for hairspray, that these costs were overestimated 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 analyses 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." Significant input regarding reformulation costs have been provided by industry representatives. In all cases, only new or additional costs were considered. Costs were not considered that would have been expected in the normal course of business if the regulation had not been in effect.

To estimate nonrecurring 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 "automotive care," "personal care," "adhesives/sealants & caulks," "cleaners & degreasers/disinfectant," "fabric care," and "waxes & polishes" 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 2003 Consumer Products Survey, the staff found that many of the products which would technically be noncomplying 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. Therefore, for the low cost analysis no major costs were added for changing delivery systems or other product attributes.

In addition, it is common that large companies having significant market share and broad product lines offer both low VOC complying products and higher VOC noncomplying products. In many cases, relatively low costs would be incurred where these companies could simply increase sales and distribution of complying products and discontinue noncomplying products.

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. In areas where it was anticipated that little or no reformulation would occur, or that the cost of reformulation would be minimal, the value for low cost was used (Automotive Windshield Washer (type A), Laundry starch product/sizing/fabric finish).

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. For categories where the majority of products were held by a few companies it was assumed that this “technology transfer” would occur, and high costs adjusted accordingly.

Therefore, staff has considered only nonrecurring 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 nonrecurring cost was 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 VII-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 $2.27 per unit (for 5 gallons of Floor Polish or Wax). Averaged over all of the noncomplying products affected by the proposed limits and other requirements, the product weighted average cost increase is about $0.06 per unit.

Table VII-9
Estimated Per-Unit Cost Increases from Both Annualized Nonrecurring and Annual Recurring Costs

Table VII-9. Estimated Per-Unit Cost Increases from Both Annualized Non-Recurring and Annual Recurring Costs

Category	Sales-Wtd Average VOC Content, %	Estimated VOC Emissions, tons/day	Typical Unit Weight Ounces	Complying Market Share	Estimated Non-complying Unit Sales Per Day in Calif.	Estimated Per Unit Production Cost Increase: Annualized Nonrecurring Low Cost/Unit	Annualized Nonrecurring High Cost/Unit	Annual Recurring Low Cost/Unit	Annual Recurring High Cost/Unit	Total Increase Low/Unit	Total Increase High/Unit	Total Increase Mid/Unit
	(A)	(B)	(C)		(D)	(E1)	(E2)	(F1)	(F2)	G1=(E1+F1)	G2=(E2 + F2)	(G1+G2)/2
Adhesives												
Construction, Panel, and Floor Covering Adhes	9.88	1.27	13	46.9	16,801	$0.00	$0.00	0.00	0.00	$0.00	$0.00	$0.00
Automotive												
Brake Cleaner												
Aerosol	43.23	4.81	14.00	4.50	24,288	$0.00	$0.02	0.00	0.00	$0.00	$0.02	$0.01
Non-Aerosol	37.67	0.145	106.00	22.40	90	$0.13	$1.68	0.00	0.00	$0.13	$1.68	$0.91
Automotive Windshield Washer Fluid (Type A)	33.1	1.7	126.90	17.00	1,075	$0.01	$0.01	0.00	0.00	$0.01	$0.01	$0.01
Carburetor or Fuel-Injection Air Intake Cleaners												
Aerosol	45.48	2.45	16.00	0.00	10,774	$0.00	$0.06	0.44	0.44	$0.44	$0.50	$0.47
Non-aerosol	59	0.450	9.90	26.40	1,821	$0.01	$0.07	0.29	0.29	$0.30	$0.36	$0.33
Engine Degreaser (aerosol)	23.47	1.05	14.00	9.00	9,305	$0.00	$0.03	0.00	0.00	$0.00	$0.03	$0.02
Household Care												
Bathroom & Tile Cleaner (non-aerosol)	0.7	0.3	24.00	83.30	9,543	$0.01	$0.01	0.00	0.00	$0.01	$0.01	$0.01
Disinfectant												
Aerosol	76.31	6.8	18.00	6.40	14,828	$0.00	$0.00	0.00	0.00	$0.00	$0.00	$0.00
Liquid	0.54	1.68	133.20	92.60	5,531	$0.00	$0.01	0.00	0.00	$0.00	$0.01	$0.01
Floor Polish or Wax (flexible)	1.08	0.76	688	82	589	$0.17	$1.34	0.00	0.00	$0.17	$1.34	$0.75
Floor Polish or Wax (nonresilient)	1.34	0.16	688	82	100	$0.29	$2.27	0.00	0.00	$0.29	$2.27	$1.28
Furniture Maintenance Product (non-aerosol)	5.09	0.7	120	30	2,567	$0.01	$0.03	0.08	0.29	$0.09	$0.32	$0.20
General Purpose Cleaner (aerosol)	12.17	0.344	18	12	4,422	$0.01	$0.03	0.00	0.01	$0.01	$0.04	$0.03
General Purpose Degreaser (aerosol)	46.24	0.98	19.00	3.10	3,459	$0.02	$0.18	0.17	0.21	$0.19	$0.39	$0.29
Laundry starch product/ sizing/ fabric finish (aerosol)	4.78	1.11	22	0.6	33,574	$0.00	$0.00	0.00	0.00	$0.00	$0.00	$0.00
Oven or Grill Cleaner (non-aerosol)	2.53	0.3	144.00	25.50	1,963	$0.00	$0.03	0.00	0.00	$0.00	$0.03	$0.02
Sanitizer												
Aerosol	93.3	1.41	10.00	0.00	4,836	$0.00	$0.00	0.00	0.00	$0.00	$0.00	$0.00
Liquid	1.62	0.47	133.2	92.5	523	$0.01	$0.03	0.00	0.00	$0.01	$0.03	$0.02
Personal Care												
Temporary Hair Color (aerosol)	94.7	0.31	3.00	0.10	3,488	$0.01	$0.10	0.00	0.00	$0.01	$0.10	$0.06

Notes:
(1) (E) = Total Annualized Non-recurring Cost / [(D) * 365]
(2) Figures in "( )" are negative (i.e., indicates potential cost savings)

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 product category definitions in the categories of Multi-purpose Solvent, Electronic Cleaner, Rubber/Vinyl Protectant, and Fabric Protectant if companies choose to relabel.

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 relabeling 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 relabel because of other proposed changes to the regulation.

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, sections 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, sections 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

1. 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)

2. 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)

3. 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)

4. 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)

5. 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)

6. 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)

7. 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)

8. 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)

9. 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)

10. 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. May 7, 2004, (ARB, 2004)

11. California Prison Industry Authority, On-Line Catalog. http://catalog.pia.ca.gov/onlinecat/catalog.php (PIA, 2006)

12. Chemical Market Reporter. Chemical Prices A-Z. http://chemicalmarketreporter.com Archive August 28, 2006. (CMR, 2006)

13. Chemical Engineering, April 1997; January 2002; June 2006.

VIII.

ENVIRONMENTAL IMPACTS

A. SUMMARY OF ENVIRONMENTAL IMPACTS

In this rulemaking, staff is proposing to amend the Consumer Products Regulation (Regulation) by establishing VOC limits for 15 categories of consumer products. The intent of these proposed amendments is to protect public health by reducing exposure to ground level ozone. Other amendments, designed to clarify various aspects of the Regulation, are also proposed. One minor amendment to the Aerosol Coatings Regulation to clarify product applicability is proposed as well.

We are also proposing to prohibit the use of Toxic Air Contaminants (TACs) in Bathroom and Tile Cleaner; Construction, Panel, and Floor Covering Adhesive; General Purpose Cleaner; and Oven Cleaner.

As part of this rulemaking, ARB staff has investigated the potential environmental impacts of the proposed amendments to the Consumer Products Regulation, and the Aerosol Coatings Regulation. 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 10.6 tons per day (tpd) is expected beginning December 31, 2008. In 2010, this reduction would grow to 11.5 tpd. Reductions in PM (secondary organic aerosols) are also expected.

Another environmental benefit of the proposal is prohibition of potential emissions of the TACs perchloroethylene (Perc), methylene chloride (MeCl), and trichloroethylene (TCE) from the four categories mentioned above. As explained in further detail below, many alternative products already exist.

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 monitor this potential impact through future surveys.

Minor changes are proposed to the Aerosol Coatings Regulation. These changes would have no adverse environmental impact because only technical changes are proposed that will not affect the environment. 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 potential excess cancer cases may be

avoided and a person's direct exposure will be reduced by prohibiting the use of the chlorinated TACs Perc, MeCl and TCE.

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 I 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 amendments.

D. AIR QUALITY ENVIRONMENTAL IMPACTS

1. Ground-level Ozone

The primary benefit of the proposed amendments to the Regulation is the reduction in 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.

Staff is proposing to raise the VOC limit for Nail Polish Remover from zero percent to one percent in order to accommodate inevitable VOC formation. In addition, certain Electronic Cleaners used in specific situations are proposed to be exempted from the current category definition. These two changes will result in an emissions shortfall of 0.17 tpd, which will be mitigated by the nearly 12 tpd VOC reductions achieved from other categories during this rulemaking.

a. New VOC Standards

Reducing ozone precursor emissions, namely VOCs, will 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 10.6 tpd, effective December 31, 2008. In 2010 this reduction would equal 11.5 tpd. The categories proposed for regulation and the corresponding VOC emission reductions are shown in Table VIII-1 below.

Total emissions from these categories in 2003 were about 26.2 tpd, and would grow to 28.6 tpd in 2010, without controls. Therefore, the staff's proposal represents about a 40 percent reduction in emissions when all limits become effective in 2010.

Table VIII-1
Proposed VOC Limits and Reductions by Product Category

Product Category	Product Form	Proposed VOC Limit (wt%)	VOC Emission Reductions (TPD)[1]
Automotive Windshield Washer Fluid: Type "A" Areas	all	25	0.30
Bathroom and Tile Cleaner	non-aerosol	1	0.13
Brake Cleaner	all	10	3.70
Carburetor or Fuel-Injection Air Intake Cleaner	all	10	2.00
Construction, Panel, and Floor Covering Adhesive	all	7	0.41
Disinfectant	aerosol non-aerosol	70 1	0.66 0.49
Engine Degreaser	aerosol	10	0.62
Floor Polish or Wax: for resilient flooring material for nonresilient floor material	 all all	 1 1	 0.43 0.05
Furniture Maintenance Product	non-aerosol	3	0.06
General Purpose Cleaner	aerosol	8	0.04
General Purpose Degreaser	aerosol	10	0.68
Laundry Starch/Sizing/Fabric Finish Product	aerosol non-aerosol	4.5 4.5	0.06 0.00
Oven Cleaner	non-aerosol	1	0.09
Sanitizer	aerosol non-aerosol	70 1	0.46 0.33
Temporary Hair Color	aerosol	55	0.13

[1] VOC emission reductions in tons per day from 2003 emissions.

b. Nail Polish Remover Limit

The Nail Polish Remover (NPR) category consists of products which are designed and labeled primarily for the purpose of removing nail polish or other nail coatings from the surface of fingernails and toenails. These products generally consist of a solvent or mixture of solvents which act to dissolve the nitrocellulose present in nail polish. Depending upon formulation, nail polish removers may have a secondary function of removing artificial nails, wraps, and tips. Nail Polish Removers were first regulated under "Phase I" of the Consumer Products Regulation adopted in October of 1990.

Under "Midterm II" of the consumer products regulation adopted in October of 1999, a VOC limit of zero percent by weight for NPR became effective in December 2004. Many existing formulations that are compliant with this standard are

comprised of acetone, an exempt solvent. Yet, a significant market exists for non-acetone products because acetone may damage artificial nails. The traditional solvent for non-acetone formulations is ethyl acetate, a VOC.

In order to meet the NPR VOC standard, as well as market demand, some manufacturers attempted to reformulate using the exempt solvent methyl acetate. Methyl acetate was suggested as a possible non-acetone reformulation option in the Initial Statement of Reasons in the Midterm II regulatory amendments when the zero percent standard was originally adopted. In October 2004, two major NPR manufacturers approached staff to discuss difficulties they had encountered with reformulated non-acetone based NPR products. The manufacturers encountered two issues resulting from the use of methyl acetate. First, a small amount of VOC impurities exist in the raw materials, up to 0.5 percent, even in the purest grade of methyl acetate. Second, methyl acetate, when in contact with water, undergoes a chemical reaction that yields methanol and acetic acid (both VOCs) as products, which continues even after the product is packaged. Over the course of conducting accelerated aging and stability testing of new formulations, the manufacturers discovered the reaction occurs at various compositions of methyl acetate, even with additives to minimize the reaction (such as pH buffers). They estimate the reaction can form approximately one percent VOC within one year after manufacture. With the adopted limit of zero percent VOC in place, these methyl acetate-based NPR products could conceivably be subject to enforcement action, despite being formulated and manufactured in good faith and distributed in a timely fashion.

To accommodate these unavoidable circumstances, staff proposes raising the NPR VOC limit to one percent by weight, to become effective December 31, 2007. Manufacturers have indicated that a one percent VOC level is achievable by using high-grade methyl acetate (which contains the lowest levels of methanol contamination) and the inclusion of additives to minimize VOC formation over time. Raising the limit amounts to an emission reduction shortfall of 0.04 ton per day, which will be offset by emission reductions resulting from the current regulatory amendments.

c. Electronic Cleaners Definition Change

In the 2004 Amendments to the Consumer Products Regulations, the Board approved a VOC limit of 75 percent by weight for “Electronic Cleaners.” At the time the limit was approved, it was determined that the limit was commercially and technologically feasible. As is routinely done, before limits become effective, staff consults with stakeholders to ensure that the limits are technologically feasible. In 2005, several manufacturers indicated that they were encountering problems reformulating certain “Electronic Cleaners” to meet the 75 percent limit. These niche products are those that are used in manufacturing settings where products must be non-flammable, electrically non-conductive, have high dielectric strength, and have a high degree of solvency (Kauri-butanol (Kb) values of 45-55). Kb value is a measure of a compound’s ability as a solvent). These attributes would be needed for cleaning

electronic components on a manufacturing line. Industry representatives also indicated that low-toxicity was important in this segment of the market.

Therefore, staff is proposing to exempt products from the definition, and the 75 percent VOC limit. The label for these certain electronic cleaner products must clearly display the statement: "not for retail sale" and must be sold exclusively to establishments which manufacture or construct goods or commodities. This proposal should ensure that the full range of electronic cleaning products continue to be available to the California market. However, staff will continue to evaluate the need for the exemption as additional technology becomes available. Staff has also determined that approximately 31 of the 106 "Electronic Cleaners" reported in the 2003 Survey would meet the proposed exemption. This reduces the emission reductions claimed from the category in the 2004 Amendments by 0.13 tpd. This small shortfall will be offset by the emission reductions achieved through this rulemaking.

2. Proposed Prohibition on Use of Perc, MeCl, and TCE

Staff has also evaluated the potential for VOC emission increases resulting from other proposals within this rulemaking, namely the elimination of Perc, MeCl, and TCE in four categories. Staff does not anticipate any increase in VOC emissions due to prohibiting these three chlorinated TACs in these four categories because they are not currently used in formulating these products. Our analyses follow.

Staff is proposing to prohibit the use of Perc, MeCl, and TCE, in Bathroom and Tile Cleaner; Construction, Panel, and Floor Covering Adhesive; General Purpose Cleaners and Oven Cleaners. Although no products in these categories currently contain Perc, MeCl or TCE, staff proposes to prohibit their use so that they are not used as reformulation pathways in the future. Note, however, that TCE is a VOC and is therefore an unlikely replacement for non-TAC VOCs in reformulating products to meet lower VOC limits.

3. 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 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 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.*, 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 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 that 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 2010 terms, will require substituting 11.5 tpd of non-VOC ingredients or exempt VOCs for 11.5 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, which 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 predict how manufacturers will 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.

4. 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 the six substances identified in the Kyoto Protocol. These are: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), and sulfur hexafluoride (SF_6). These gases have long lifetimes in the atmosphere, from about a year to several thousand years depending on the particular gas.

Climate research has identified other species that also have the potential to significantly alter climate. These other species, which have much shorter atmospheric lifetimes than CO_2 (on the order of days or less depending on the species), typically have not been directly included in climate-related emission reduction efforts due to the scientific uncertainty regarding the magnitude or (in some cases) direction of their climate change effect (warming or cooling).

The non-Kyoto species of interest are primarily man-made pollutants emitted chiefly as byproducts of fossil fuel and biomass fuel combustion. Some difficulty arises

because several of these substances have both warming and cooling effects, with considerable remaining uncertainty as to their net effect on climate. Those species generally believed to result in net warming include carbon monoxide (CO), volatile organic compounds (VOC), hydrogen (H_2), and the fraction of particulate matter (PM) substantially consisting of black carbon (BC). With the exception of PM, the warming effect of these substances results from the formation of tropospheric ozone and methane, which themselves contribute to warming. Other substances of potential concern include nitrogen oxides (NO_x) and sulfur dioxide (SO_2), but these substances can have a cooling effect.

The metric typically used to compare the relative importance of pollutants with respect to their global warming is the Global Warming Potential (GWP). The 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 readily removed from the atmosphere by various processes including photochemical reactions and wet and dry deposition. Thus, the challenge associated with the use of GWPs is the choice of time horizon when comparing substances with significantly different atmospheric lifetimes as it will have an impact on the relative importance of the pollutants with respect to global warming. The Kyoto Protocol uses GWPs calculated for a 100-year time horizon.

The GWP of a compound may reflect a direct effect as well as an indirect effect on global warming. 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. For example, VOC 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 and methane.

a. Volatile Organic Compounds (VOC)

Almost all VOC 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 low molecular weight alkanes and halogenated compounds. VOC also contribute indirectly to global warming via their contribution to the formation of ozone and methane, which are potent greenhouse gases. Typically, the indirect effect is the dominant path by which VOCs contribute to

global warming. The indirect forcing of VOC is still poorly quantified and requires the use of global three-dimensional chemical transport models. Accurate calculations of these effects are a difficult problem in atmospheric chemistry.

b. Carbon Dioxide (CO_2)

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 2003 Survey data indicate that CO_2 is used in certain consumer products considered for regulation, such as Brake Cleaners, Carburetor or Fuel-Injection Air Intake Cleaners, General Purpose Degreasers and Engine Degreasers. In these categories, CO_2 use is likely to increase as manufacturers reformulate to meet the lower proposed VOC limits. Other categories for which CO_2 is a probable reformulation pathway include: General Purpose Cleaners, Sanitizers, and Disinfectants. Co-benefits are expected to the extent that CO_2 replaces VOC propellants in consumer products. Specifically, less ozone and methane will be formed, thus lowering the population's exposure to a pollutant with serious health effects. Further, the contribution of CO_2 to global warming is likely less than that of the VOC being replaced. In addition, most CO_2 used as a propellant is a recycled by-product of existing processes and, therefore, does not increase global warming from a lifecycle standpoint (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, at this point, HFC-152a is the chief HFC alternative for hydrocarbon propellants in consumer products due to its significantly lower GWP (120) compared to HFC-134a (1300) (Applegate, 1995). The chemical HFC-152a was also recognized as the refrigerant of choice in ARB's greenhouse gas emission regulation for light-duty vehicles since, at that time, it was a leading technology option. At present, staff recognizes that the refrigerant industry is now actively pursuing the development of HFC refrigerants in the sub-100 GWP range for the mobile air conditioning industry. If successful deployment of such HFC refrigerants is achieved for the vehicle sector, those refrigerants may become viable propellant options for consumer products. Therefore, staff must continue to follow these developments thus facilitating the use of the most viable options for addressing the consumer projects regulatory requirements as well as reducing or minimizing the emissions of pollutants contributing to climate change.

Staff believes that in four categories under consideration for regulation, Brake Cleaners, Disinfectants, Sanitizers, and aerosol Temporary Hair Color, HFC-152a may be a potential reformulation option. If VOC propellants in these categories was replaced with HFC-152a, total emissions of HFC-152a would be 1.29 tpd. This represents a worst-case scenario. Staff believes usage would be considerably less due to the other reformulation options available.

Also, when cost considerations are factored in (HFC-152a is about $1.77 per pound, versus VOC propellants at $0.50 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, thus a significant increase in use is not anticipated. Further, the development of new lower-GWP refrigerants may also provide additional options in the future.

Based on 2003 Survey data, HFC-134a is a probable reformulation option for aerosol Temporary Hair Color products. If hydrocarbon propellant in this category were entirely replaced with HFC-134a, emissions of this compound would be approximately 0.07 tpd. A slight chance also exists that HFC-134a could be used in General Purpose Degreasers and Brake Cleaners. We do not predict increased usage of this compound due to its higher GWP and because its use is not recommended except in certain specific uses. But most importantly, as mentioned above, the chemical industry may have in the near-term replacement options for HFC-134a for the mobile air conditioning sector. These options will need to be considered for potential application to consumer products.

Again, when cost considerations are factored in (HFC-134a is about $3.50 per pound, versus VOC propellants at $0.50 per pound), it is anticipated that manufacturers will use as little HFC-134a as possible, or none at all, when reformulating their aerosol products.

Based on the analysis presented here, the proposed action will lead to reductions in emissions of VOC with the potential (depending upon the alternative used) for a small change in the emissions of global warming pollutants. Staff believes that the potential increase in global warming pollutant emissions are tempered by the agency's need to be mindful of health protection via reduction of ozone precursors. As presented here, strategies for reducing VOC emissions through the promotion of alternative low or non-VOC propellants must also consider the impact on emissions of global warming pollutants. In consideration of the health benefits associated with lower VOC emissions as well as the availability and continued development of low-GWP alternatives, the proposed amendments will lead to an improvement in public health by advancing efforts to meet air quality standards. Other proposed amendments relating to the prohibitions on use of TACs are not expected to lead to increases in emissions of global warming pollutants as the likely replacements are anticipated to consist of VOC or low-GWP exempt compounds**.**

5. 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 HCFCs. 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.

The VOC limit affecting Electronic Cleaners was proposed in the 2004 Amendments. This rulemaking is simply proposing to exempt certain Electronic Cleaners form the definition proposed in the 2004 Amendments. As such, any potential adverse environmental impacts resulting from the VOC limits affecting Electrical and Electronic Cleaners were addressed in the Initial Statement of Reasons for the 2004 Amendments. Therefore, we do not expect any increase in that ozone depleting compound.

Because it lacks chlorine, HFC-152a probably contributes only slightly to ozone depletion (Wallington *et al.*, 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.

2. VOC Solvents

Volatile organic compound solvents commonly used in consumer products that have been identified as TACs, include xylenes, ethyl benzene, toluene, trichloroethylene, hexane, and methyl ethyl ketone (ARB, 2003). Table VIII-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 VIII-2
Pollutant-Specific Health Effects for Select VOC TACs of Concern

Compound	Total Emissions TPY[1]	Toxicological Endpoints[2]	
		Acute	Chronic
Xylenes	6,489.2	Eye; Respiratory System	Nervous System; Respiratory System
Hexanes	453.0	N/A	Nervous System
Methyl Ethyl Ketone	633.0	Eyes; Respiratory System	N/A
Toluene	2,218.0	Central Nervous System	Reproductive; Developmental
Ethyl Benzene	98.8	N/A	Liver; Kidney; Endocrine

[1] 2003 Consumer Products Survey data (ARB, 2003)
[2] (OEHHA, 2005b)

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 40 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 its 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 VIII-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 VIII-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 VIII-3
Pollutant-Specific Health Effects Values Used for Determining Potential Health Impacts [1]

Compound	Cancer Unit Risk Factor $(\mu g/m3)^{-1}$	Non-cancer Reference Exposure Levels ($\mu g/m^3$)		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 (OEHHA, 2000, 2005a, 2005b).

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 1µg/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 $(\mu g/m^3)^{-1}$, the potential excess cancer risk for a person continuously exposed over a 70-year lifetime to $1\mu g/m^3$ 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, the categories where they could be used, and cancer and non-cancer impacts that can result from exposure to Perc, MeCl, and TCE. None of the products in the four categories for which the TAC prohibition is proposed contain any of the TACs proposed for prohibition.

I. 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 VIII-4.

Table VIII-4
Physical Properties of Perchloroethylene (Perc)

CAS Number:	127-18-4
Molecular Formula:	C_2Cl_4
Molecular Weight:	165.85
Boiling Point:	121 ^oC at 760 mm Hg
Melting Point:	-22 ^oC
Vapor Pressure:	18.47 mm Hg at 25 ^oC
Vapor Density:	5.7 (air = 1)
Density/Specific Gravity:	1.6230 at 20/4 ^oC
Log Octanol/Water Partition Coefficient:	3.40
Conversion Factor:	1 ppb = 6.78 $\mu g/m^3$

bb. Sources and Emissions of Perc

Perchloroethylene is not currently used in Bathroom and Tile Cleaner; Construction, Panel and Floor Covering Adhesive; General Purpose Cleaners; or

Oven Cleaners. However, if it is not prohibited for use in these categories, it could conceivably be used as an avenue for compliance with the proposed lower VOC standard, increasing human exposure.

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, 2006). Table VIII-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, 2005a), 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 VIII-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 ^{o}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 VIII-5.

Table VIII-5
Physical Properties of Methylene Chloride (Dichloromethane)

CAS Number:	75-09-2
Molecular Formula:	CH_2Cl_2
Molecular Weight:	84.94
Boiling Point:	39.75 ^{o}C at 760 mm Hg
Melting Point:	-95 ^{o}C
Vapor Pressure:	349 mm Hg at 20 ^{o}C
Vapor Density:	2.93 (air = 1)
Density/Specific Gravity:	1.3255 at 20/4 ^{o}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 not currently used in Bathroom and Tile Cleaner; Construction, Panel, and Floor Covering Adhesive; General Purpose Cleaners; or Oven Cleaners. However, if it is not prohibited for use in these categories, it could conceivably be used as an avenue for compliance with the proposed lower VOC standard, increasing human exposure.

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, 2006). Table VIII-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, 2005a), 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 VIII-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 VIII-6.

Table VIII-6
Physical Properties of Trichloroethylene (TCE)

CAS Number:	79-01-6
Molecular Formula	C_2HCl_3
Molecular Weight:	130.40
Boiling Point:	86.7 ^oC
Melting Point:	-73 ^oC
Flash Point:	89.6 ^oC
Vapor Pressure:	100 mm Hg at 32 ^oC
Vapor Density:	4.53
Density:	1.4649 at 20/4 ^oC
Log Octanol/Water Partition Coefficient:	2.42
Conversion Factor:	1 ppb = 5.33 µg/m^3

bb. Sources and Emissions of TCE

Trichloroethylene is not currently used in Bathroom and Tile Cleaner; Construction, Panel, and Floor Covering Adhesive; General Purpose Cleaners; or Oven Cleaners. However, if it is not prohibited for use in these categories, it could conceivably be used as an avenue for compliance with the proposed lower VOC standard, increasing human exposure.

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, 2006). Table VIII-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 have 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, 2005a). Table VIII-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).

c. 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 Bathroom and Tile Cleaner; Construction, Panel, and Floor Covering Adhesives; General Purpose Cleaner; and Oven Cleaner. 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. In

2004, the ARB prohibited the use of these three chlorinated solvents in Adhesive Removers, Contact Adhesives, Electrical Cleaners, Electronic Cleaners, Footwear or Leather Care Product, and Graffiti Removers and General Purpose Degreasers.

The proposed prohibition on use of Perc, MeCl, and TCE in Bathroom and Tile Cleaner; Construction, Panel, and Floor Covering Adhesive; General Purpose Cleaner; and Oven Cleaner 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.

4. Summary

The prohibition of 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. 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 Bathroom and Tile Cleaner; Construction, Panel and Floor Covering Adhesive; General Purpose Cleaners; and Oven Cleaners 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 are contained in Chapter VII 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).

To summarize, staff finds that the proposed prohibition on use of Perc, MeCl, and TCE in Bathroom and Tile Cleaner; Construction, Panel, and Floor Covering Adhesive; General Purpose Cleaners; and Oven Cleaners is necessary to reduce the health risk associated with use of these compounds. 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, is not quantified in this report. 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, improvement in lung function, or reduced premature deaths.

The VOC reductions from the proposed amendments are designed as partial fulfillment of the State Implementation Plan (SIP). Thus one can conclude that increments of progress towards attainment improve the public's health. The proposed amendments will also likely reduce PM (secondary organic aerosols (SOA)). However, our focus here is on reducing ground level ozone. 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 *et al.*, 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 2010, these reductions from adopting the amendments would result in a total of about 11.5 tpd from 15 product categories. This represents about a 40 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.

Table VIII-7
Summary of VOC Reductions in Categories Proposed for Regulation

Product Category	Product Form	Proposed VOC Limit (wt %)	VOC Emission Reductions (TPD)[1]
Automotive Windshield Washer Fluid: Type "A" Areas	all	25	0.13
Bathroom and Tile Cleaner	non-aerosol	1	0.20
Brake Cleaner	all	10	3.70
Carburetor or Fuel-Injection Air Intake Cleaner	all	10	2.00
Construction, Panel, and Floor Covering Adhesive	all	7	0.41
Disinfectant	aerosol non-aerosol	70 1	0.66 0.49
Engine Degreaser	aerosol	10	0.62
Floor Polish or Wax: for resilient flooring material for nonresilient floor material	 all all	 1 1	 0.43 0.05
Furniture Maintenance Product	non-aerosol	3	0.06
General Purpose Cleaner	aerosol	8	0.08
General Purpose Degreaser	aerosol	10	0.20
Laundry Starch/Sizing/Fabric Finish Product	aerosol non-aerosol	4.5 4.5	0.06 0.00
Oven Cleaner	non-aerosol	1	0.09
Sanitizer	aerosol non-aerosol	70 1	0.46 0.33
Temporary Hair Color	aerosol	55	0.13

[1] VOC emissions reductions from 2003 emissions.

We are better able to assess the reduced health risk associated with prohibiting the use of the chlorinated solvents Perc, MeCl, and TCE in Bathroom and Tile Cleaner; Construction, Panel, and Floor Covering Adhesive; General Purpose Cleaner; and Oven Cleaner. Overall, the proposed amendments would prevent chlorinated solvent emissions by as much as 0.83 tpd annually in 2008, which could prevent increased cancer risk. 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.

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. Moreover, a substantial number of potential excess cancers would likely be prevented by prohibiting the use of chlorinated TACs. Table VIII-7 summarizes the VOC reductions anticipated in each category.

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.

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 (µg/L) (ARB, 2000a).

The proposed prohibition of Perc, MeCl and TCE in four categories of consumer products would not alleviate sanitation districts' current concerns with Perc. However, the proposed prohibition of Perc, MeCl, and TCE from these categories proposed for regulation may prevent an increase in the amount of chlorinated solvents reaching the storm drains and the waste water treatment plants if these products are misused or improperly discarded.

In summary, with regard to solid waste and water quality impacts, staff finds that the proposed rulemaking would not adversely impact solid waste or water quality. In fact, the proposal should result in no impact on solid waste and would have a neutral-to-positive impact on water quality.

H. 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.

REFERENCES

1. Air Resources Board, Technical Support Document. Proposed Identification of Methylene Chloride as a Toxic Air Contaminant, Part B Report. May 1989. (ARB, 1989)

2. Air Resources Board, Staff Report/Executive Summary, and Part B. Proposed Identification of Trichloroethylene as a Toxic Air Contaminant. August 1990. (ARB, 1990)

3. 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)

4. Air Resources Board. Toxic Air Contaminant Identification List – Summaries. September 1997. (ARB, 1997)

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

6. 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)

7. 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)

8. 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)

9. Air Resources Board. 2003 Consumer and Commercial Products Survey. November, 2004. (ARB, 2003)

10. 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)

11. 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)

12. 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)

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

14. 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)

15. 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)

16. 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)

17. 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)

18. 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)

19. 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)

20. 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)

21. McConnell, R., et al. Asthma in Exercising Children Exposed to Ozone: A Chort Study. Lancet, 2002, pp. 359:386-391. (McConnell *et al.*, 2002)

22. 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 Luebeck, 1996)

23. 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)

24. 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. http://www.oehha.ca.gov/air/acute_rels/allAcRELs.html. (OEHHA, 2000)

25. Office of Environmental Health Hazard Assessment (OEHHA). All Chronic Reference Exposure Levels Adopted by OEHHA as of February 2005. http://www.oehha.ca.gov/air/chronic_rels/AllChrels.html. (OEHHA, 2005a)

26. 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. May, 2005. (OEHHA, 2005b)

27. 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, 2006. (OEHHA, 2006)

28. 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)

29. 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)

30. Pankow, J. F. An Absorption Model of the Gas/Aerosol Partitioning Involved in the Formation of Secondary Organic Aerosol. Atmospheric Environment, Volume 28, 1994, pp. 189-193. (Pankow, 1994b)

31. 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)

32. 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)

33. 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)

34. United States Environmental Protection Agency. Environmental Indicators: Ozone Depletion. http://www.epa.gov/spdpublc/science/indicat/. (U.S. EPA, 2003)

35. 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)

36. 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-Hydrocarbons. Atmospheric Environment, Volume 26, 1992, pp. 403-420. (Wang *et al.*, 1992)

37. 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)

38. 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)

IX.

FUTURE ACTIVITIES

In this Chapter, we present future activities of the Board's consumer products program. Staff is scheduled to bring new consumer product limits to the Board in 2007. Staff also has committed to a survey in 2007 for the 2006 sales year, which will be used as the basis for a rulemaking in 2008. The 2007 8-hour ozone SIP will soon be developed, and it is expected that it will contain commitments for further reductions from consumer products in the next decade. 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 fifteen years. Each of the activities listed above are described in detail below.

A. 2007 CONSUMER PRODUCTS REGULATION AMENDMENTS

The rulemaking scheduled for 2006 to obtain 10-15 tpd VOC reductions was broken into two parts. The first part is the rulemaking discussed in this staff report to be considered by the Board in November 2006. The remainder of the commitment will be considered in 2007. This bifurcation was proposed to address the concerns of industry representatives. Specifically, the representatives felt that with initial staff proposals to regulate over 50 product categories, there was not enough time for all technical issues to be thoroughly addressed and requested that the Board Hearing be postponed. In response to industry concerns, staff is bringing forth in November 2006 only those categories for which technical issues had been identified, discussed, and predominantly addressed. The remainder of the categories, for which technical issues remain, will be considered at the March 2007 Board Hearing.

B. 2006 CONSUMER AND COMMERCIAL PRODUCTS SURVEY

The 2006 Consumer and Commercial Products Survey (2006 Survey) will be conducted in 2007 and will cover product formulations and sales occurring in the 2006 calendar year. The 2006 Survey will predominantly 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.

C. 2008 CONSUMER PRODUCTS REGULATORY AMENDMENTS

Per the State Implementation Plan (SIP), (see discussion Chapter I), 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 2006 or 2007 rulemakings. Staff anticipates looking at innovative approaches to achieve the reductions, including but not limited to alternative packaging, and zero and near zero

emission technologies. Staff will focus on achieving reductions through mass-based limits, but where feasible, will consider the setting of reactivity-based standards.

D. 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 the CONS-2 measure can be obtained.

E. 2007 STATE IMPLEMENTATION PLAN – CONSUMER PRODUCTS EMISSIONS REDUCTION COMMITMENTS

In July 1997, U.S. EPA established a new federal 8-hour standard for ozone and fine particulate matter ($PM_{2.5}$). SIPs demonstrating attainment of the new federal ozone standard must be adopted by the local air districts and ARB, and submitted to U.S. EPA by June 15, 2007. Emission inventory updates, air quality modeling, and other work in support of the 2007 Ozone SIP has begun. ARB and local air districts are currently working on the SIP measures to show how we will meet new, stricter federal air quality standards for ozone. The preliminary draft of the State Strategy for Meeting Federal Air Quality Standards is scheduled to be released in the fall of 2006, and staff is currently holding workshops and soliciting comments. This planning document will commit ARB to further control the sources under its jurisdiction to the extent necessary to meet the standards and protect public health. The emission reduction targets in the preliminary State Strategy are challenging – significant reductions are needed from every major source category in order to meet our air quality goals in the most polluted areas of the State.

It is, therefore, expected that there will be a Consumer Products element of the 2007 SIP which will set forth a specific commitment that further emission reductions from Consumer Products will be needed.

The final draft of the State Strategy will be released in early 2007 and is set for Board consideration in the spring of 2007. The regional ozone attainment plans, which rely on emission reductions from State measures, will be heard by the Board from March to May 2007, and must be submitted to U.S. EPA by June 2007. The $PM_{2.5}$ SIP[1] must be adopted by the Board and submitted to U.S. EPA by April 2008. For the latest developments on the SIP, go to http://www.arb.ca.gov/planning/sip/sip.htm.

[1] On September 21, 2006, U.S. EPA announced a more stringent 24-hour PM standard. Final designations for the new standard are scheduled to be promulgated in 2009 (U.S.EPA, 2006).

REFERENCE

1. United States Environmental Protection Agency. “National Ambient Air Quality Standards for Particulate Matter.” September 21, 2006. (U.S. EPA, 2006)