

## SUMMARY OF BOARD ITEM

**ITEM # 00-5-1:** PUBLIC HEARING TO CONSIDER ADOPTION OF AMENDMENTS TO THE CALIFORNIA CONSUMER PRODUCTS REGULATION RELATING TO AEROSOL ADHESIVES

**STAFF RECOMMENDATION:** The staff recommends that the Board adopt the proposed amendments to the California consumer products regulation. These amendments would: eliminate the future effective 25 percent by weight (%) volatile organic compound (VOC) standard, establish new VOC limits for three categories of aerosol adhesives, prohibit the use of certain toxic air contaminants in aerosol adhesive formulations, and make other minor changes. Staff also recommends a technology review in 2004.

**DISCUSSION:** California Health and Safety Code (HSC) section 41712, require the Air Resources Board (ARB) to adopt consumer product regulations that achieve the maximum feasible reduction in VOC emissions. State law requires that all consumer product regulations be technologically and commercially feasible. In addition, HSC sections 39657 and 39658 require the ARB to identify toxic air contaminants (TACs) that are emitted in California, and to establish airborne toxic control measures to reduce exposure to identified TACs.

In January 1992, the Board adopted two tiers of standards for aerosol adhesives: a 75% standard effective January 1, 1995, and a 25% VOC standard effective January 1, 1997. In November of 1996, the Board delayed implementation of the 25% VOC standard until 2002, because at that time the Board found that the standard was not technologically or commercially feasible.

State law also requires the Board to hold a public hearing on or before July 1, 2000, on the need for, and the feasibility of, establishing a more stringent standard than the 75% VOC limit. At this hearing, the Board is to consider amendments to the aerosol

adhesive standards if it determines that more stringent limits for aerosol adhesives are feasible.

To satisfy these statutory requirements, ARB staff performed a technical assessment to determine the feasibility of establishing more stringent standards than the existing 75% VOC standard, as well as to evaluate the technological and commercial feasibility of the future effective 25% VOC standard. Based on this technology assessment, ARB staff has determined that the 25% VOC standard is not technologically or commercially feasible. However, staff has determined that it is feasible to establish more stringent standards than the existing 75% VOC standard. Therefore, ARB staff is proposing to eliminate the future effective 25% VOC standard and add standards for three new categories consisting of web spray, mist spray, and special purpose spray adhesives, that would become effective January 1, 2002.

The staff is also proposing to prohibit the use of the following TACs in aerosol adhesive formulations: methylene chloride, perchloroethylene, and trichloroethylene. The staff has determined that these TACs are not necessary in aerosol adhesive formulations, and that alternatives are available. The staff is also proposing labeling requirements and minor changes to improve clarity.

The proposed amendments were developed with participation of the aerosol adhesives industry and other interested parties. The staff conducted two public workshops, one public meeting, individual company meetings, and several teleconference calls. The staff also visited and telephoned potential industrial users. To gather information on product sales, formulations, and technological advances, staff conducted a comprehensive survey.

**SUMMARY AND IMPACTS:**

The staff's proposal would result in a statewide VOC emission reduction of about 0.2 tons per day (TPD), which is about 1 TPD less than that expected from implementation of the future effective 25% VOC standard. The proposed prohibition on the use of

the three TACs would result in a reduction of about 18 tons per year (TPY) of methylene chloride emissions and about 0.5 TPY of combined perchloroethylene and trichloroethylene emissions. In terms of the "1994 SIP currency" the staff's proposal would result in a 0.28 TPD statewide shortfall. Staff will address the shortfall when the statewide control strategy is revised in 2001.

To provide full disclosure, staff conducted an analysis of the costs manufacturers would incur to reformulate their existing products to meet the proposed VOC limits. Based on the analysis, staff expects most manufacturers to be able to absorb the added costs of the proposed amendments without an adverse impact on their profitability. The cost-effectiveness of the proposal is estimated to be \$6.02 per pound of VOC reduced. This estimate is consistent with existing ARB consumer products regulations.

The cost per unit increase is estimated to be about 30¢ per unit. To the extent manufacturers pass these costs along to the consumer, the actual retail price changes may be lower or higher than indicated by this analysis. However, the overall price increase should represent less than an 8 percent increase in per unit cost to the consumer.



California Environmental Protection Agency



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**Air Resources Board**

**Staff Report: Initial Statement of Reasons  
For the Proposed Amendments to the  
California Consumer Products Regulation  
Relating to Aerosol Adhesives**

**Release Date: April 7, 2000**





**TITLE 17. CALIFORNIA AIR RESOURCES BOARD**

**NOTICE OF PUBLIC HEARING TO CONSIDER ADOPTION OF PROPOSED AMENDMENTS TO THE CALIFORNIA CONSUMER PRODUCTS REGULATION RELATING TO AEROSOL ADHESIVES**

The Air Resources Board (ARB or Board) will conduct a public hearing at the time and place noted below to consider adoption of amendments to the California consumer products regulation (title 17, California Code of Regulations, sections 94508 et seq.) relating to aerosol adhesives:

- DATE: May 25, 2000
- TIME: 9:30 a.m.
- PLACE: Air Resources Board  
Board Hearing Room, Lower Level  
2020 L Street  
Sacramento, California

This item will be considered at a two-day meeting of the ARB, which will commence at 9:30 a.m., May 25, 2000, and may continue at 8:30 a.m., on May 26, 2000. This item may not be considered until May 26, 2000. Please consult the agenda for the meeting, which will be available at least 10 days before May 25, 2000, to determine the day on which this item will be considered.

This facility is accessible to persons with disabilities. If accommodation is needed, please contact ARB's Clerk of the Board by May 15, 2000, at (916) 322-5594, or TDD (916) 324-9531, or (800) 700-8326 for TDD calls from outside the Sacramento area, to ensure accommodation.

**INFORMATIVE DIGEST OF PROPOSED ACTION AND PLAIN ENGLISH POLICY STATEMENT OVERVIEW**

**Sections Affected:** Proposed amendments to sections 94508, 94509, 94512, and 94513, title 17, California Code of Regulations (CCR).

**Background**

Section 41712 of the California Health and Safety Code requires the ARB to adopt regulations to achieve the maximum feasible reduction in volatile organic compound (VOC) emissions from consumer products. As part of the regulatory process, the ARB must determine that adequate data exist for it to adopt the regulations. The ARB must also determine that the regulations are technologically and commercially feasible, and necessary to carry out the Board's responsibilities under Division 26 of the Health and Safety Code. In addition, Health and Safety Code

section 41712(c) provides that no regulation shall be adopted which requires the elimination of a product form.

Pursuant to Health and Safety Code section 41712, the Board has adopted the California consumer products regulation (sections 94507-94517, title 17, CCR). The regulation includes VOC standards for aerosol adhesives, which were originally approved by the Board on January 9, 1992. The original standards specified two tiers of VOC limits for aerosol adhesives: a VOC limit of 75 percent by weight, effective January 1, 1995, and a VOC limit of 25 percent by weight, effective January 1, 1997. In November of 1996, the Board approved a delay in the implementation of the 25 percent VOC limit until 1/1/2002, in order to ensure that technologically and commercially feasible products would continue to be available.

In 1996 the Legislature enacted Assembly Bill (AB) 1849 (Stats. 1996, Chapter 766) which made several changes to Health and Safety Code section 41712. One of these changes specified that the Board's existing 75 percent VOC standard for aerosol adhesives would apply, effective January 1, 1997, to all uses of aerosol adhesives, including consumer, industrial, and commercial uses (see Health and Safety Code section 41712(h)(2)). AB 1849 also requires the ARB, on or before July 1, 2000, to prepare a study and conduct a public hearing on the need for, and the feasibility of, establishing a more stringent standard or standards for aerosol adhesives (see Health and Safety Code section 41712(h)(3)). If the ARB finds that more stringent limits for aerosol adhesives are expected to become feasible, the ARB is required to adopt a standard or standards to implement more stringent VOC limits.

### **Description of the Proposed Regulatory Action**

As required by Health and Safety Code section 41712(h)(3), the ARB staff has conducted a technology assessment, and has determined that VOC limits more stringent than the currently specified 75 percent limit are feasible for aerosol adhesives. Staff has also determined that the 25 percent VOC limit, which is to become effective on January 1, 2002, is not technologically or commercially feasible. Therefore, the proposed regulatory action would eliminate the 25 percent VOC limit. The proposed action would also establish new VOC limits for three new categories of aerosol adhesives.

The three new categories are "mist spray adhesives," "web spray adhesives," and "special purpose spray adhesives." The "special purpose spray adhesives" are further subcategorized into six subgroups. The three main categories and six subgroups were proposed to maintain the unique performance properties of these aerosol adhesive products, while lowering their VOC content to the maximum extent feasible. Different VOC limits are proposed for "mist spray adhesives" and "web spray adhesives," and three different VOC limits are proposed for the various subgroups within the "special purpose spray adhesives" category. ARB staff believes that these VOC limits represent the most stringent VOC limits that are technologically and commercially feasible at this time, based on the current knowledge of aerosol adhesive technologies.

The proposed regulatory action would also include labeling and other requirements to facilitate compliance and enforcement of the new standards. In addition, reporting requirements would be

imposed on responsible parties, who would be required to report various types of product information to support a future technology assessment that would be conducted by ARB staff.

Effective January 1, 2002, the proposed regulatory action also prohibits the use of methylene chloride, perchloroethylene, and trichloroethylene, which are toxic air contaminants, in aerosol adhesives manufactured for use in California. Finally, the proposed amendments would revise various definitions related to aerosol adhesives, and make other minor modifications to the consumer products regulation to allow incorporation of the proposed amendments and provide clarity.

Because the proposed amendments would eliminate the future effective 25 percent VOC standard and replace it with several new standards that are less stringent, the result would be that statewide, about 1 ton per day (TPD) of future emission reductions would not be achieved. However, it should also be noted that manufacturers would still need to reduce the VOC content of most of the products they currently sell in order to meet the proposed January 1, 2002, VOC limits. Staff estimates that the proposed new VOC limits would achieve about 0.2 TPD reduction in VOC emissions relative to the currently effective 75 percent VOC limit for aerosol adhesives. Also, the proposed toxics prohibition would reduce methylene chloride emissions by 18 tons per year (TPY), and perchloroethylene and trichloroethylene emissions by about 0.5 TPY combined.

### **Comparable Federal Regulations**

The U.S. EPA has promulgated a national consumer products rule under section 183(e) of the federal Clean Air Act: *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). The rule specifies VOC limits for a number of consumer product categories, including aerosol adhesives. In the U.S. EPA's rule, there is only one VOC standard for aerosol adhesives, which is 75 percent by weight, effective December 10, 1998. There are other significant differences between the U.S. EPA's rule and the ARB consumer products regulation. The U.S. EPA's rule applies nationwide to consumer product manufacturers, importers and distributors (but not retailers), while the ARB regulation applies to any person (including retailers) who "sells, supplies, offers for sale, or manufactures consumer products for use in the State of California." The U.S. EPA's rule does not regulate a number of product categories, which are currently regulated under the ARB regulation. For the categories that are regulated under both rules, many of the ARB's limits (such as the aerosol adhesives limit) are more stringent than the U.S. EPA's limits. All of the VOC limits in the U.S. EPA's rule have an effective date of December 10, 1998, whereas the VOC limits in the ARB regulation are phased-in from 1993 to 2005. Finally, the U.S. EPA's rule has an unlimited "sell-through" period for noncomplying products manufactured before the effective date of the limits, whereas California law allows a three year sell-through period. Also, the U.S. EPA's rule does not specifically impose restrictions on the use of toxic compounds in consumer products.

### **AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSON**

The ARB staff has prepared an Initial Statement of Reasons (ISOR) for the proposed regulatory

action which includes a summary of the environmental and economic impacts of the proposal, and supporting technical documentation. Copies of the ISOR may be obtained from the ARB's Public Information Office, 2020 L Street, Sacramento, California 95814, (916) 322-2990, at least 45 days prior to the scheduled hearing (May 25, 2000). The ISOR contains the full text of the proposed amendments. The staff has also compiled a record, which includes all information upon which the proposal is based. This material is available for inspection upon request to the contact person identified below.

The ARB has determined that it is not feasible to draft the regulation in plain English due to the technical nature of the regulation; however, a plain English summary of the regulation is available from the agency contact person named in this notice, and is also contained in the ISOR for this regulatory action.

To obtain the ISOR in an alternative format, please contact the Air Resources Board ADA Coordinator at (916) 322-4505, TDD (916) 324-9531, or (800) 700-8326 for TDD calls from outside the Sacramento Area. This notice, the ISOR, and all subsequent regulatory documents are being made available on the ARB Internet site on this rulemaking, <http://www.arb.ca.gov/regact/conspro/conspro.htm>. Further inquiries regarding this matter should be directed to the agency contact person: Mr. Gary Yee, Manager, Industrial Section, Stationary Source Division, at (916) 327-5986.

#### **COSTS TO PUBLIC AGENCIES AND TO BUSINESSES AND PERSONS AFFECTED**

The determinations of the Board's Executive Officer concerning the cost or savings necessarily incurred in reasonable compliance with the proposed regulatory action are presented below.

The Executive Officer has determined that the proposed regulatory action 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 costs or savings to local agencies.

In developing this regulatory proposal, the ARB staff evaluated the potential economic impacts on private persons and businesses. The Executive Officer has determined that the proposed regulatory action will not have a significant adverse economic impact on businesses, including the ability of California businesses to compete with businesses in other states, or on private persons or businesses directly affected. In accordance with Government Code section 11346.3, the Executive Officer has determined that the proposed amendments should have minor impacts on the creation or elimination of jobs within the State of California, minor impacts on the creation of new businesses and the elimination of existing businesses within the State of California, and minor impacts on the expansion of businesses currently doing business within the State of California. A detailed assessment of the economic impacts of the proposed amendments can be found in the ISOR.

As explained in the ISOR, under the proposed amendments manufacturers would have to meet less stringent standards than are currently scheduled to take effect. Therefore, the proposed

amendments would result in an overall cost savings to affected businesses. However, it should be noted that some manufacturers would incur costs to reformulate their existing products to meet the proposed VOC limits for the three aerosol adhesive categories, relative to the VOC levels of products that are currently being sold. Staff evaluated these costs and determined that manufacturers will be able to absorb the added costs of the proposed amendments without an adverse impact on their profitability.

The Board's Executive Officer has also determined, pursuant to Government Code section 11346.5(a)(3)(B), that the regulation will affect small business.

Before taking final action on the proposed regulatory action, the ARB must determine that no alternative considered by the agency would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons or businesses than the proposed action.

### **SUBMITTAL OF COMMENTS**

The public may present comments relating to this matter orally or in writing at the hearing, and in writing or by e-mail before the hearing. To be considered by the ARB, written submissions must be addressed to and received by the Clerk of the Board, Air Resources Board, P.O. Box 2815, Sacramento, CA 95812, or 2020 L Street, 4<sup>th</sup> Floor, Sacramento, CA 95814, no later than 12:00 noon Pacific Time May 24, 2000, or received by the Clerk of the Board at the hearing. To be considered by the ARB, e-mail submissions must be addressed to [aeroadh@listserv.arb.ca.gov](mailto:aeroadh@listserv.arb.ca.gov) and received at the ARB no later than 12:00 noon Pacific Time, May 24, 2000.

The ARB requests, but does not require, that 30 copies of any written statement be submitted and that all written statements be filed at least 10 days prior to the hearing so that ARB staff and Board Members have time to fully consider each comment. The ARB encourages members of the public to bring any suggestions for modification of the proposed regulatory action to the attention of staff in advance of the hearing.

### **STATUTORY AUTHORITY AND REFERENCES**

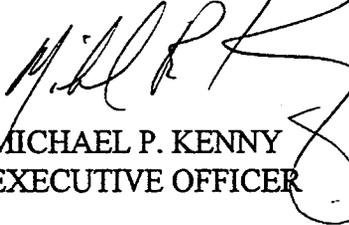
This regulatory action is proposed under the authority granted to the ARB in sections 39600, 39601, 39658, 39666, 41511, and 41712 of the Health and Safety Code. This action is proposed to implement, interpret, or make specific sections 39002, 39600, 39650, 39655, 39656, 39658, 39659, 39666, 40000, 41511, and 41712 of the Health and Safety Code.

**HEARING PROCEDURES**

The public hearing will be conducted in accordance with the California Administrative Procedure Act, Title 2, Division 3, Part 1, Chapter 3.5 (commencing with section 11340) of the Government Code. Following the public hearing, the ARB may adopt the regulatory language as originally proposed or with nonsubstantial or grammatical modifications. The ARB may also adopt the proposed regulatory language with other modifications if the modifications are sufficiently related to the originally proposed text that the public was adequately placed on notice that the regulatory language as modified could result from the proposed regulatory action. In the event that such modifications are made, the full regulatory text, with the modifications clearly indicated, will be made available to the public for written comment at least 15 days before it is adopted.

The public may request a copy of the modified regulatory text from the ARB's Public Information Office, 2020 L Street, Sacramento, California 95814, (916) 322-2990.

CALIFORNIA AIR RESOURCES BOARD



MICHAEL P. KENNY  
EXECUTIVE OFFICER

Date: March 28, 2000

**State of California  
California Environmental Protection Agency  
AIR RESOURCES BOARD  
Stationary Source Division**

**STAFF REPORT: INITIAL STATEMENT OF REASONS  
FOR THE PROPOSED AMENDMENTS TO THE CALIFORNIA  
CONSUMER PRODUCTS REGULATION RELATING TO AEROSOL  
ADHESIVES**

**PUBIC HEARING TO CONSIDER AMENDMENTS TO THE  
CALIFORNIA CONSUMER PRODUCTS REGULATION**

**Date of Release: April 7, 2000  
Scheduled for Consideration: May 25, 2000**

**Location:**

**California Air Resources Board  
Board Hearing Room, Lower Level  
2020 L Street  
Sacramento, California 95814**

**This report has been reviewed by the staff of the Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use. To obtain this document in an alternative format, please contact the Air Resources Board ADA Coordinator at (916) 322-4505, TDD (916) 324-9531, or (800) 700-8326 for TDD calls from outside the Sacramento area. This report is available for viewing or downloading from the Air Resources Board's Internet site; <http://www.arb.ca.gov/regact/>**



## **Acknowledgments**

This report was prepared with the assistance and support from the other divisions and offices of the Air Resources Board. In addition, staff would like to acknowledge the assistance and cooperation that staff has received from many individuals and organizations. In particular, staff would like to thank the National Paint and Coatings Association, 3M, Sherwin-Williams, Camie-Campbell, Amrep, North American Professional Products, WilsonArt Intl., the United States Environmental Protection Agency, the South Coast Air Quality Management District, Ventura County Air Pollution Control District, San Joaquin Valley Unified Air Pollution Control District, Bay Area Air Quality Management District, Sacramento Air Quality Management District

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# Initial Statement of Reasons for the Proposed Amendments to the California Consumer Products Regulation Relating to Aerosol Adhesives

## TABLE OF CONTENTS

<b>I. SUMMARY .....</b>	<b>1</b>
A. Introduction .....	1
B. Summary of Proposed Amendments.....	1
C. Effects of the Proposed Amendments .....	4
D. Requirements in State Law.....	5
E. Regulatory Development Process and Evaluation of Alternatives .....	6
F. Compliance with the Proposed Amendments.....	7
G. Aerosol Adhesive Emissions .....	8
H. Economic Impacts.....	9
I. Environmental Impacts .....	11
J. Future Activities .....	13
<b>II. RECOMMENDATION.....</b>	<b>15</b>
<b>III. BACKGROUND.....</b>	<b>17</b>
A. Legislative History .....	17
B. Consumer Products Regulation Background.....	18
C. Regulating Toxic Air Contaminants in Consumer Products.....	19
D. The State Implementation Plan (SIP) .....	20
E. Comparable Federal Regulations .....	21
<b>IV. DISCUSSION OF AEROSOL ADHESIVES.....</b>	<b>23</b>
A. Aerosol Adhesives Use.....	23
B. Composition .....	23
C. Previous Product Surveys and Emissions.....	25
<b>V. EVALUATION OF THE AEROSOL ADHESIVE VOC STANDARD.....</b>	<b>27</b>
A. 1998 ARB Aerosol Adhesives Survey .....	27
B. 1999 Technology Assessment.....	29
C. Present Formulations.....	29
D. Research and Development Efforts.....	30
1. Solvents .....	30
2. Propellants .....	31
3. Other Technologies.....	32
E. Findings .....	32
<b>VI. DESCRIPTION AND RATIONALE OF THE PROPOSED AMENDMENTS.....</b>	<b>35</b>
A. Elimination of the 25% VOC Standard.....	35
B. Aerosol Adhesive VOC Limits.....	35
1. Mist Sprays .....	36
2. Web Sprays.....	37
3. Special Purpose.....	39
C. Labeling Requirements.....	45
D. Prohibition on the Use of Toxic Compounds .....	45
E. Future Technology Assessment .....	48

F. Other Amendments.....	48
<b>VII. ENVIRONMENTAL IMPACTS OF THE PROPOSED AMENDMENTS .....</b>	<b>49</b>
A. Overview of Environmental Impact Analysis.....	49
B. Legal Requirements Applicable to Analysis.....	50
C. Emissions Reductions and Potential Environmental Impacts.....	50
1. Impact on Ground Level Ozone.....	50
2. Impact on Particulate Matter (PM10).....	51
3. Impact on Global Warming.....	51
4. Impact on Ozone Depletion.....	52
5. Impact on Water Quality and Solid Waste Disposal.....	52
D. Health Risk Assessment of Prohibiting the Use of Toxic Compounds in Aerosol Adhesives ....	53
E. Impacts on the State Implementation Plan.....	53
1. Impacts on the 1994 Ozone SIP and Inventory.....	53
2. SIP Lawsuit Settlement.....	54
3. Review of SIP Baseline Measure: Aerosol Adhesives.....	54
4. Impacts of Proposed Amendments.....	54
5. Summary of 1994 SIP Analysis of Proposed Amendments .....	55
<b>VIII. ECONOMIC IMPACTS OF THE PROPOSED AMENDMENTS .....</b>	<b>57</b>
A. Introduction.....	57
B. Summary of Findings.....	58
C. Economic Impacts Analysis on California Businesses as Required by the California Administrative Procedures Act (APA).....	58
1. Legal Requirements.....	58
2. Findings.....	58
3. Discussion.....	59
4. Results.....	60
D. Analysis of Potential Impacts to California State or Local Agencies.....	62
E. Analysis of the Cost-Effectiveness and the Impacts on Per Unit Cost.....	62
1. Methodology.....	63
2. Assumptions.....	63
3. Results.....	65
F. Discussion of the Economic Impact of Prohibiting the Use of MeCl, Perc and TCE in Aerosol Adhesive Formulations.....	66

## REFERENCES

### APPENDIX A: PROPOSED CONSUMER PRODUCTS REGULATION ORDER

### APPENDIX B: CRITERIA FOR DETERMINING TECHNOLOGICALLY AND COMMERCIALY FEASIBLE

### APPENDIX C: MEETING NOTICES

### APPENDIX D: 1998 CARB AEROSOL ADHESIVES SURVEY

### APPENDIX E: DISCUSSION OF AEROSOL ADHESIVES SURVEY RESULTS

### APPENDIX F: 1999 TECHNICAL ASSESSMENT OF AEROSOL ADHESIVES

### APPENDIX G: HEALTH RISK AND NEEDS ASSESSMENT OF METHYLENE CHLORIDE, PERCHLOROETHYLENE AND TRICHLOROETHYLENE

## **I. SUMMARY**

In this summary, a plain English discussion is presented of the Air Resources Board (ARB or Board) staff's proposal including new volatile organic compound (VOC) limits for aerosol adhesives and an assessment of the technological and commercial feasibility of the existing VOC limit. Also, a discussion of the staff's proposal and rationale to prohibit the use of toxic compounds, such as methylene chloride, in the formulation of aerosol adhesive products is provided. This chapter is intended to satisfy the requirements of Government Code section 11346.2(a)(1), which requires that a noncontrolling "plain English" summary of the regulation be made available to the public.

### **A. Introduction**

California Health and Safety Code (HSC) section 41712, requires the ARB to adopt consumer product regulations that achieve the maximum feasible reduction in VOC emissions. State law requires that all consumer product regulations be technologically and commercially feasible. In addition, HSC sections 39657 and 39658 require the ARB to identify toxic air contaminants (TACs) that are emitted in California, and to establish airborne toxic control measures to reduce exposure to identified TACs.

In January 1992, the Board adopted standards for aerosol adhesives as part of the Phase II Consumer Products Regulation. For aerosol adhesives, two tiers of standards for VOC content were adopted: a 75 percent by weight (%) standard effective January 1, 1995, and a 25% VOC standard effective January 1, 1997. In November of 1996, the ARB delayed implementation of the 25% VOC standard until 2002, because at that time the Board found that the standard was not technologically, nor commercially feasible.

State law also requires the Board to hold a public hearing on or before July 1, 2000, on the need for, and the feasibility of, establishing a more stringent standard than the 75% VOC limit. At this hearing, the Board is to consider amendments to the aerosol adhesive standards if it determines that more stringent limits for aerosol adhesives are feasible and at a minimum, represent best available retrofit control technology (BARCT).

### **B. Summary of Proposed Amendments**

#### **Why is staff proposing amendments to the aerosol adhesive standards?**

Staff's proposal to revise the aerosol adhesive standards of the consumer products regulation is based on a recent technical evaluation of the standards. Staff's technical evaluation consisted of conducting an in-depth survey on the composition and VOC content of products sold in California in 1998 and an assessment of manufacturer's research and development efforts to formulate lower VOC products. Staff found that the future 25% VOC limit will not be attainable by 2002, as presently required. However, staff did find that other VOC limits, lower than the current 75% VOC limit, are achievable and meet the criteria for being technologically and commercially feasible.

Staff also found that toxic compounds such as methylene chloride, perchloroethylene, and trichloroethylene are still being used in aerosol adhesives, although in small amounts. In the technical assessment, staff found that aerosol adhesives can be formulated without these toxic compounds and that alternative products already exist. Eliminating these toxic compounds from aerosol adhesives would reduce the cumulative exposure and risks from aerosol adhesives and other sources of these toxic compounds.

### **What amendments to the aerosol adhesive standards are being proposed?**

#### *Eliminate the 25% VOC standard-*

Based on staff's technical assessment, the future 25% VOC standard will not be attainable by 2002. The original basis for the 25% VOC standard was the anticipation that water-based technology would prove to be technologically and commercially feasible. Attempts to manufacture and commercially market a water-based aerosol adhesive have not been successful. Except for methylene chloride, staff has not identified an acceptable solvent or hardware technology to meet the future 25% VOC standard.

#### *New Categories of VOC Standards-*

In evaluating the ability to meet more stringent VOC standards, staff considered the requirements of Health and Safety Code (HSC) section 41712 that requires the ARB to establish standards that do not eliminate any consumer product form from the marketplace. This section also requires the ARB to establish standards that are based on best available retrofit control technology (BARCT) for aerosol adhesives and are technologically and commercially feasible. Accordingly, staff proposes new VOC standards that are contained in Table I-1.

Staff is proposing that aerosol adhesives be divided into three major categories, with one of the categories further subdivided into six subcategories. The new categories are special purpose applications, mist sprays, and web sprays. The categories are proposed to recognize each category's and subcategory's unique performance criteria in relation to the lowest achievable VOC limit.

The proposed standards were developed based on staff's evaluation of the 1998 aerosol adhesives product survey, staff's technology assessment, and discussions with industry experts. The proposed standards include VOC limits that staff believes represent BARCT and are technologically and commercially feasible. Staff found that these VOC limits represented the maximum VOC emission reductions feasible, based on the current knowledge of aerosol adhesive technologies.

In developing the proposed VOC limit for each category and subcategory, staff evaluated the lowest achievable VOC level that could be found in current products being commercially marketed, or in anticipated products that could be marketed in the

near future. Staff found that in many cases, products formulated with methylene chloride, perchloroethylene, and trichloroethylene could meet a VOC level substantially below the current 75% VOC standard. However, because these compounds are toxic, staff chose to exclude the use of those compounds as a compliance option. Therefore, staff is proposing VOC standards that represent the maximum VOC reductions that are technologically and commercially feasible, without the use of methylene chloride, perchloroethylene, or trichloroethylene.

**Table I-1  
Proposed New Product Category VOC Limits**

Product Category	Weight Percent VOC
Mist Sprays	65
Web Sprays	55
Special Purpose	
Mounting	70
Flexible Vinyl	70
Automotive Headliner	65
Polystyrene Foam	65
High Pressure Laminate	60
Polyolefins	60

#### *Labeling Requirements-*

Staff is proposing new requirements for aerosol adhesive product labeling that would require manufacturers to indicate on the product labels the appropriate product category. This requirement would facilitate compliance with the proposed VOC limits and discourage misapplication.

#### *Toxics Prohibition-*

Staff proposes to prohibit methylene chloride, perchloroethylene and trichloroethylene, which are toxic air contaminants (TACs), in the formulation of aerosol adhesives. Staff found that these toxic compounds are used very little in aerosol adhesives, and manufacturers have formulated safer alternative products. Also, these toxic compounds are used in other consumer and industrial products. Eliminating these TACs in aerosol adhesives would reduce the overall exposure and risk to these TACs.

#### *Reporting Requirements and Technology Review-*

Staff is also proposing to continue the requirement that industry report the status of research and development efforts to assist in the potential to meet lower VOC standards in the future. Along with this information, staff proposes that a technology assessment be conducted at a future date. Staff believes that in the future, new solvent and hardware technology may be developed to further reduce VOCs in aerosol adhesives.

### *Other Amendments-*

Finally, staff is proposing other minor changes to improve the overall clarity of the proposed standards and to facilitate incorporation of the proposed amendments into the existing consumer products regulation.

## **C. Effects of the Proposed Amendments**

### **Who would be affected by the proposed amendments?**

The amendments would affect any person who uses, sells, supplies, offers for sale, or manufactures for use in California any aerosol adhesive product subject to the standards. This includes manufacturers, distributors, wholesalers, retailers, and end users.

The primary impact would be on manufacturers and marketers of aerosol adhesives, who would have to reformulate most of their products. There would also be an impact on distributors and retailers, who must ensure that they are selling or supplying complying products. In addition, since products would have to be reformulated, suppliers of chemicals, propellants, containers, valves, and other aerosol product components may be impacted.

### **What products would be affected by the proposed amendments?**

In the 1998 aerosol adhesive product survey, information was provided for 136 products. Of these products, 33 were formulated with either methylene chloride, perchloroethylene, trichloroethylene. Together, these 33 aerosol adhesive products comprise about three percent of the total marketshare. The remaining aerosol adhesives are formulated with VOCs, or a mixture of VOCs and exempt compounds, such as acetone. These products make up the majority of the marketshare.

Of the 136 products reported, about 80 percent, or 111 would need to be reformulated to meet the proposed standards and the toxic prohibition. For the 33 products formulated with methylene chloride, perchloroethylene and/or trichloroethylene, staff has determined that there are alternative products available that do not contain these toxic compounds. One product formulated with water is no longer being produced because of manufacturing and application problems.

### **Would the performance of aerosol adhesives products be affected and would complying products be available to meet the demand?**

There would be some changes in the characteristics of the reformulated aerosol adhesive products. However, staff does not expect significant impacts on product performance. The proposal includes establishing three general categories of products: mist, web and special purpose. The special purpose category is further distinguished

by six subcategories to address specific performance characteristics needed for certain special applications. Except for the web category, complying products already exist in the market. However, for all of the proposed categories, manufacturers have indicated that existing products can be reformulated, or new products developed, to meet market demand.

#### **D. Requirements in State Law**

##### **Do the proposed amendments meet the requirements of State law pertaining to aerosol adhesives?**

Yes. As discussed earlier, State law requires the Board to prepare a study and hold a public hearing on or before July 1, 2000, to evaluate the need for, and the feasibility of, establishing a more stringent standard or standards than the current 75% VOC standard. The Board is to consider amendments to the aerosol adhesive standards if it determines that more stringent limits for aerosol adhesives are feasible and at a minimum, represent best available retrofit control technology (BARCT). The Board must also determine if the limits are technologically and commercially feasible.

In response to State law, staff conducted a technology assessment to determine if a more stringent standard or standards are feasible. Staff determined that lower VOC limits are feasible and staff is recommending that the Board find that the VOC limits contained in the proposed amendments meet BARCT and are technologically and commercially feasible. Staff also is recommending that the Board find that the future 25% VOC standard, effective January 1, 2002, is not technologically and commercially feasible and does not represent BARCT.

##### **Do the proposed amendments meet the requirements of State law pertaining to toxic air contaminants?**

Health and Safety Code sections 39657 and 39658 require the ARB to identify toxic air contaminants (TACs) that are emitted in California, and to establish airborne toxic control measures to reduce exposure to identified TACs. Health and Safety Code section 39658 further requires the ARB to determine the need and appropriate degree of regulation for each TAC and to assess the availability, suitability, and relative efficacy of other substitute compounds that are less hazardous.

The Board identified methylene chloride in July 1989, trichloroethylene in October 1990, and perchloroethylene in October 1991 as TACs. The Board determined that these TACs are probable human carcinogens and did not establish a threshold level, below which there would be no adverse health effects.

Staff, in addressing the requirements of HSC section 39658, has prepared a "need assessment" to determine the need and appropriate degree of regulation. This evaluation is contained in Appendix G. According to staff's evaluation, the use of aerosol adhesives containing methylene chloride, perchloroethylene and

trichloroethylene can pose a potential health risk. Together with other numerous consumer and industrial products and processes that contain these and/or other TACs, cumulative exposure and risk to these TACs may be significant. Therefore, any reduction of these TACs in aerosol adhesives would reduce the cumulative exposure and risks from these toxic compounds.

### **E. Regulatory Development Process and Evaluation of Alternatives**

#### **How did the ARB staff develop the proposed amendments?**

The staff developed the proposed amendments with participation of stakeholders including: 3M Products Company, Sherwin Williams, Camie-Campbell, Amrep, DAP, Hydrosol, and WilsonArt. The National Paint and Coatings Association (NPCA) has actively coordinated the participation of the manufacturers and has been instrumental in gaining consensus among the industry group. Also, the U.S. EPA and five local air pollution control districts participated in the process.

The staff first worked with industry in developing a survey form to gather information on 1998 aerosol adhesive product sales and formulations, and on the manufacturers' research and development efforts. The survey form was mailed out in March 1999. Staff subsequently gathered product sales literature and visited potential industrial users including a silk screening plant, countertop manufacturer, framing shop, and embroidery shop. Staff also called potential industrial users to gather information on uses and manufacturers. After reviewing the survey results, staff held conference calls with several manufacturers to discuss their individual survey responses.

Staff also worked with the NPCA and several companies in evaluating industry recommendations for new VOC limits for aerosol adhesives. Staff's discussions with industry resulted in several refinements to the recommendations, which assisted staff in developing the proposed amendments.

Several meetings were conducted with individual companies, as well as a public meeting and a public workshop, to discuss the results of the survey, the technical assessment, and the proposed recommendations for new VOC limits. Staff also plans to conduct another public workshop after the release of the Staff Report to further discuss the proposed amendments.

#### **What information was gathered from the ARB's 1998 Aerosol Adhesive Survey?**

The 1998 aerosol adhesive product survey requested: (1) general information about the responding companies; (2) product specific formulations including VOC content, solvents, sales data and cost-information; and (3) information on the company's research and development effort to achieve the 25% VOC standard by January 1, 2002. The company information and product specific cost information were needed to perform staff's economic impact analysis. The product specific formulation and sales information were needed to determine the VOC emissions inventory.

The staff worked with the industry and the trade association to ensure that the responses to the survey were complete as possible. To allow the industry access to the information during development of the proposed amendments, staff worked with the industry to develop non-confidential summaries of the survey data. As a result, staff believes the survey data represents over 90 percent of the emissions associated with aerosol adhesive products.

## **F. Compliance with the Proposed Amendments**

### **How will manufacturers comply with the proposed VOC limits?**

Manufacturers reformulating their noncomplying products to meet the proposed VOC limits would need to replace some of the VOC solvents or propellants in their formulations with exempt compounds or non-VOC ingredients. Manufacturers are expected to use primarily the following compliance options to meet the proposed VOC limits:

- Increase the amount of acetone;
- Increase the amount of solids;
- Reconfigure spray delivery systems; and
- Use exempt propellant, hydrofluorocarbon-152a.

### **Are the proposed VOC limits technologically and commercially feasible?**

The ARB has previously established criteria for determining whether VOC standards are technologically and commercially feasible in the consumer product regulations, and this criteria is contained in Appendix B. Staff believes that the proposed VOC limits meet this criteria and are, therefore, technologically and commercially feasible. Staff's evaluation of the latest aerosol adhesive technologies concludes that products can be reformulated to gain incremental emission reductions through the use of exempt compounds, modifications to active ingredients, and improvements to hardware.

The proposed VOC limits specify three general adhesive categories, with one of these categories further sub-grouped to allow successful reformulation of products used for specialized applications. Although the proposed limits require most aerosol adhesives to be reformulated, aerosol adhesive manufacturers concur with staff that the proposed VOC limits are attainable by 2002. In addition, the proposed amendments also meet the requirements of BARCT, as defined by the 1990 ARB California Clean Air Act guidance document, "Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology".

**Is the proposed prohibition on certain toxic compounds feasible and are there alternatives?**

Manufacturers have reduced the use of methylene chloride, perchloroethylene and trichloroethylene in aerosol adhesive formulations from historical use due to the toxic nature of these compounds. Manufacturers have eliminated these compounds from most of their product lines altogether to reduce product liability and to meet requests from consumers for safer products. However, some manufacturers have continued to produce limited products containing methylene chloride, perchloroethylene and trichloroethylene to address specific performance criteria that some customers have requested. Staff's discussions with these manufacturers indicate that several are about to phase-out these toxic compounds from their product lines. Other manufacturers indicate that their limited sales of these products in California have little effect on their overall business, and they would likely exclude these products from California sale if these toxic compounds were no longer available for use.

Although these toxic compounds are little used in aerosol adhesives, public and worker exposure can be significant due to the cumulative exposure that results from all products and sources that use toxic compounds. Methylene chloride and perchloroethylene are used in many consumer and industrial products, as well as in industrial processes such as degreasing operations. Eliminating the use of toxic compounds in aerosol adhesives would help reduce the cumulative exposure to the general public and to workers.

As part of the process to develop an airborne toxic control measure, HSC section 39658 requires an assessment of efficacy of alternative substitutions. Staff, in conducting the technology assessment for aerosol adhesives, found that there are alternative products that do not contain these toxic compounds that provide similar performance and applications. Manufacturers have readily commented that the use of these toxic compounds is not necessary to meet the various types of applications and demands for aerosol adhesives. The NPCA, which represents manufacturers with the majority of the market share and products, have indicated that they would support a prohibition of these compounds in aerosol adhesives.

**G. Aerosol Adhesive Emissions****What is the emissions inventory for aerosol adhesives?**

The 1990 emissions inventory for aerosol adhesives was based on a manufacturer survey of products sold in California for 1990. Manufacturers were requested to report their California sales and VOC content for each product. At the time, aerosol adhesives were regulated by both the local air pollution control districts (districts) and the State. The districts regulated industrial use while the State regulated consumer use. In this context, manufacturers responded to the product survey by reporting only products they marketed for consumer and institutional use. Based on the product survey, emissions

from aerosol adhesives in 1990 were estimated to be about 150 tons per year (TPY), or about 0.4 tons per day (TPD).

Last year, staff conducted another manufacturer product survey for products sold in California in 1998. This survey requested manufacturers to submit California sales for all uses of aerosol adhesives. State law, enacted in 1996, provided the ARB with new authority to regulate all aspects of aerosol adhesives that include industrial, commercial, and consumer products. The authority of districts to set more stringent standards for industrial uses of aerosol adhesives ceased at that time. State law provided that districts would regain this authority on January 1, 2000. The revised emission inventory for 1998 is estimated at about 700 TPY, or about 1.9 TPD. The differences between the 1990 and the 1998 inventories are accounted for by the growth in product sales and the inclusion of industrial uses of aerosol adhesives that were excluded from being reporting on the 1990 inventory.

### **What are the emission reduction benefits from the proposed amendments?**

Aerosol adhesives account for about 700 TPY of VOC emissions. Based on the existing future effective 25% VOC limit, the VOC emission reductions are estimated to be about 1.2 TPD. Under the proposed amendments, staff expects VOC emissions reductions to be about 0.2 TPD. The 0.2 TPD estimate includes the increase in VOC emissions resulting from reformulating current products to eliminate the use of methylene chloride, perchloroethylene and trichloroethylene. It is expected that the reformulation of these toxic products would include the use of VOC solvents or propellants to replace these toxic compounds.

The proposed toxic prohibition on these toxic compounds would reduce statewide methylene chloride emissions by about 18 TPY. Perchloroethylene and trichloroethylene emissions would be reduced by about 0.5 TPY combined.

### **H. Economic Impacts**

#### **What are the expected economic impacts of the proposed amendments on businesses?**

Under the proposed amendments, manufacturers would have to meet less stringent standards than are currently scheduled to take effect. Therefore, the proposed amendments would result in an overall cost savings to affected businesses. However, staff conducted an analysis of the costs manufacturers would incur to reformulate their existing products to meet the proposed VOC limits. This was done in order to provide full disclosure of economic information that may be of interest to industry and members of the public.

As stated earlier, the proposed VOC limits would primarily impact aerosol adhesive manufacturers and marketers (companies which contract out the manufacturing of their products). Staff recognizes that other industries could also be impacted to a lesser

degree, but this is difficult to quantify. These industries include distributors, retailers, and "upstream" suppliers who supply containers, valves, solvents, propellants, and other chemicals used in aerosol coatings.

In conducting an economic impact analysis, staff evaluated the proposed amendments for potential impacts on profitability and other aspects of businesses subject to the proposed limits (with particular attention to California businesses), the cost-effectiveness of the limits, and the estimated cost impacts to consumers. To conduct the analysis, staff relied on a combination of publicly available financial databases and information provided by aerosol adhesive manufacturers.

Based on this analysis, staff expects most manufacturers to be able to absorb the added costs of the proposed amendments without an adverse impact on their profitability. The complete economic analysis is contained within Chapter VIII.

The proposed amendments are not expected to have a significant impact on employment, or business creation, elimination, or expansion. Also, the proposed amendments are not expected to have a significant impact on the competitiveness of California businesses compared with those outside of California. This is because companies that sell aerosol adhesive products in California have to meet the proposed VOC limits, whether located in or outside of California.

#### **Would the proposed amendments be cost-effective?**

Cost-effectiveness is one measure of a standard's efficiency in reducing a given amount of pollutant (often reported in dollars to be spent per pound of VOC reduced). Under the proposed amendments, manufacturers would have to meet less stringent standards than are currently scheduled to take effect. Therefore, the proposed amendments would result in a cost savings to affected businesses relative to the future 25% VOC limit. However, staff conducted an analysis of the cost-effectiveness of reformulating existing products to meet the proposed VOC limits. To conduct our analyses, staff relied on specific formulation data from the 1998 ARB product survey, industry journals/literature, and discussions with industry representatives. Our analyses considered separately the impacts on the cost-effectiveness from annual costs, including annualized nonrecurring (fixed) costs (e.g., total research and development (R&D), product and consumer testing, equipment purchases/modifications, development of new labels, etc.) and annualized recurring costs (e.g., changes in raw materials, separate California inventory, etc.).

Based on these analyses, the cost-effectiveness of the proposed aerosol adhesive standards is estimated to be \$6.02 per pound of VOC reduced. This estimated cost-effectiveness is consistent with the existing ARB consumer products regulation, including the Mid-term Measures and Mid-term Measures II Regulations, which varied from no cost to about \$7.10 and \$6.30 respectively, per pound of VOC reduced.

## **Would consumers have to pay more for aerosol adhesives subject to the proposed amendments?**

Staff estimates the cost per unit increase to be about \$0.30 per unit. To the extent manufacturers pass these costs along to the consumer, the actual retail price changes may be lower or higher than indicated by this analysis. However, the overall price increase associated with the proposed amendments should represent less than an eight percent increase in per unit cost to the consumer. Chapter VIII shows staff's detailed analyses of the unit cost increase.

### **I. Environmental Impacts**

As discussed earlier, the proposed amendments would eliminate the existing 25% VOC standard and replace it with several new standards that are less stringent; resulting in about 1 TPD less emission reductions statewide. Therefore, the proposed amendments would achieve less VOC reductions than the existing 25% standard to be implemented in 2002. However, these changes are necessary to preserve the technological and commercial feasibility of the VOC limits and to be representative of BARCT. The proposed amendments allow manufacturers to continue to manufacture consumer acceptable products that would meet the market demand. These considerations should override any loss in VOC reductions that may occur as a result of the proposed amendments.

It should be noted that manufacturers would still need to reduce the VOC content of most of the products they are selling in order to meet the proposed January 1, 2002, VOC limits. This is because the proposed VOC limits are lower than the currently applicable limit of 75% VOC which became applicable on January 1, 1995. Staff estimated that the proposed January 1, 2002, VOC limits would achieve about 0.2 TPD reduction in VOC emissions relative to the current 75% VOC limit for aerosol adhesives, which would result in a positive impact on air quality and public health.

The proposed amendments would also have a positive impact by reducing public and worker exposure to toxic compounds. Eliminating the use of methylene chloride from aerosol adhesives would result in reducing emissions of this compound by about 18 TPY. Perchloroethylene and trichloroethylene emissions would be reduced by about 0.5 TPY combined.

Based on staff's analysis, as detailed in Chapter VII, no other adverse environmental impacts are expected to result from the proposed amendments. Also, the potential effect of the proposed amendments on air quality, global warming, stratospheric ozone depletion, and the impacts on water quality and solid waste disposal were evaluated and found to not be significant.

**How would the proposed amendments reduce the risk to public health?**

The U.S. EPA and the ARB have listed methylene chloride, perchloroethylene, and trichloroethylene, as hazardous air pollutants and toxic air contaminants, respectively. These compounds have been shown to cause adverse health effects in humans when exposed to established acute threshold concentrations of these compounds. Also, the ARB has determined that these toxic compounds are probable human carcinogens and that no minimum threshold levels exist, below which there are no adverse health effects.

Staff estimates that the risks to workers and the general population from the current use of aerosol adhesives containing these TACs are likely small. Staff estimated worker exposure to be several orders lower than established Occupational Safety and Health Administration workplace standards. In regard to the risk to the general population, staff estimated, using a conservative model, the potential cancer risk to range from 3 to 30 chances in a million. Less conservative assumptions in the model would predict cancer risks several times lower.

Although staff believes that the risks resulting from the current use of aerosol adhesives containing methylene chloride, perchloroethylene, and trichloroethylene are small, staff acknowledges that there are consumer and industrial products and processes that use these toxic compounds. Cumulative exposure and risks from the sources may be significant. The proposed amendments would eliminate the use of these compounds in aerosol adhesives, which would reduce emissions, public and worker exposure, and risks to these toxic compounds.

**Do the proposed amendments satisfy the commitments in the SIP?**

No. The proposed amendments to the aerosol adhesive standards would relax the future effective 25% VOC limit and would result in less emission reductions, resulting in a small SIP shortfall. Also, contributing to the SIP shortfall is the use of acetone, an exempt compound, since the 1994 SIP treats acetone as a VOC and no credit is given in "1994 SIP currency" when acetone is used to reduce VOC emissions.

The projected shortfall is estimated to be about 0.28 TPD of VOC emission reductions statewide in 2010 from what was assumed in the 1994 SIP. Although using acetone to meet the proposed VOC limits provides real emission reductions, these benefits are not credited in "1994 SIP currency".

As discussed earlier, based on the current inventory, the proposed amendments would achieve about 0.2 TPD of VOC emission reductions, or about a 10% reduction in emissions. If the percent reduction based on the current inventory is applied to the 1994 SIP inventory, the proposed amendments would provide about 0.05 TPD of VOC reductions. Again, because the 1994 SIP gives no credit for acetone, the SIP shortfall remains 0.28 TPD.

Compared with the currently effective 75% standard for aerosol adhesives, the proposed amendments are expected to provide emission reductions statewide toward meeting the State and federal clean air goals. Federal ozone nonattainment areas rely on emission reductions from consumer products, including aerosol adhesives, to meet federal ozone standards between 2005 and 2010, depending on the area. However, using "1994 SIP currency", the staff's proposal would fall short of the 1994 SIP baseline emission reductions target by about 0.28 TPD of VOC emission reductions statewide in 2010. Staff will address this shortfall when the statewide control strategy is revised in 2001. At that time, staff will be assessing all feasible cost-effective emission reductions, including re-examining the standards currently in place for a broad range of consumer products under the jurisdiction of the ARB.

## **J. Future Activities**

### **What future activities are planned for aerosol adhesives?**

The proposed amendments would extend the requirement for manufacturers to track and report their research and development efforts towards reformulating their products with lower VOCs. ARB staff intends to use this information to conduct a technology assessment in 2004 to determine if the aerosol adhesives VOC limits should be lowered.

Currently, there are new solvents being evaluated for ozone reactivity, toxic effects, and other environmental concerns that may have the potential to be used in the formulation of aerosol adhesives. These exempt solvents may hold promise in providing manufacturers with better solvent properties and the ability to further lower the VOC content in aerosol adhesives. The proposed technological assessment would consider any future advancement in exempt solvents as well as advancements in polymer and hardware technology.



## II. RECOMMENDATION

Staff recommends that the Board adopt the proposed amendments to the aerosol adhesive standards of the consumer products regulation.

Based on the technical assessment of the future 25% VOC standard that becomes effective in January 2002, staff is recommending that the Board determine that this standard is not technologically nor commercially feasible. Staff is also recommending that the Board determine that the proposed VOC limits for aerosol adhesives are technologically and commercially feasible and represent BARCT. Staff is also recommending that the Board determine that the use of toxic compounds such as methylene chloride is not necessary in the formulation of aerosol adhesive products since alternative solvents and products are available.



### **III. BACKGROUND**

This chapter summarizes the background regarding the ARB's authority to adopt consumer product standards and to regulate toxic air contaminants.

#### **A. Legislative History**

The ARB's authority to regulate aerosol adhesives and other consumer products is contained in Health and Safety Code (HSC) section 41712. Health and Safety Code Section 41712 was originally enacted by the California Clean Air Act in 1988. By enacting section 41712, the legislature gave the ARB new authority to control emissions from consumer products, an area that had previously been subject to very few air pollution control standards.

Health and Safety Code section 41712 requires the ARB to adopt regulations to achieve the maximum feasible reduction in VOCs emitted from consumer products. As part of the regulatory adoption process, the ARB must determine that adequate data exist to adopt regulations. The ARB must also find that the regulations are necessary, technologically and commercially feasible, and do not eliminate a product form.

By 1996, several districts had adopted adhesives rules that included standards for aerosol adhesives. District standards for aerosol adhesives were not uniform. In 1996, the legislature amended Health and Safety Code section 41712 by enacting Assembly Bill 1849 (AB 1849, Sher; Stats. 1996, Chapter 766). The AB 1849 amendments gave the ARB sole authority (until January 1, 2000) to set standards for all uses of aerosol adhesives to ensure uniform standards applicable on a statewide basis. The ARB's 75% VOC standard for aerosol adhesives was expanded to cover all aerosol adhesive applications: consumer, commercial, and industrial. Beginning January 1, 2000, local districts are free to adopt more stringent standards.

Assembly Bill 1849 also requires the ARB to conduct an evaluation on the need for, and feasibility of, establishing a more stringent standard and to hold a public hearing by July 1, 2000. At the hearing, the ARB is to report the findings of their evaluation and to propose appropriate standards reflective of best available retrofit control technology.

In addition to regulating criteria pollutants, the ARB is also granted authority under HSC sections 39656 to 39658, identify and regulate toxic air contaminants. The HSC Section 39656 and 39658 specify criteria that the ARB must follow to formally identify a compound as a toxic air contaminant, and to develop an airborne toxic control measure (ATCM). Health and Safety Code section 39658 also specifies that the ARB must conduct an assessment to determine the need and appropriate level of regulation for each ATCM. To date, the ARB has identified over 200 compounds as toxic air contaminants and has promulgated several ATCMs to reduce exposure to these compounds.

## B. Consumer Products Regulation Background

The ARB's plan to reduce emissions from consumer products has led to the adoption of several consumer product regulations:

- Antiperspirant and Deodorant Regulation (1989)
- Phase I Consumer Products Regulation (1990)
- Phase II Consumer Products Regulation Amendments (1992)
- Alternative Control Plan (1994)
- Aerosol Coatings Regulation (1995, 1998)
- Mid-term Measures (1997)
- Hairspray Credit Program Regulation (1997)
- Mid-term Measures II (1999)

The first regulation, the antiperspirant and deodorant regulation (Title 17, California Code of Regulations (CCR), sections 94500-94506.5), was adopted in November 1989 and reduced VOC emission limits from antiperspirants and deodorants...

The ARB then adopted a more comprehensive consumer products regulation (Title 17, CCR, sections 94507-94517) in two phases. The Phase I consumer products regulation was approved in October 1990 and placed limits on 16 consumer product categories. The second phase (Phase II) consumer products regulation, approved by the Board in January 1992, added ten additional consumer product categories, including household adhesives, to the Table of Standards (which specified the allowable VOC content of consumer products within specified time periods). Household adhesives were categorized as "aerosol" and "all other forms." For aerosol adhesives, two tiers of standards for VOC content were adopted: a 75% standard effective January 1, 1995 and a 25% standard effective January 1, 1997.

The third ARB regulation, known as the alternative control plan (Title 17, CCR, sections 94540-94555) was approved by the ARB in September 1994. The Alternative Control Plan (ACP) is a voluntary, market-based regulation, which provides manufacturers flexibility by allowing compliance to an aggregate emissions cap, or "bubble". This regulation supplements the consumer products regulations by allowing aerosol adhesive manufacturers additional flexibility when formulating their products. The ARB adopted the fourth regulation, the aerosol coatings regulation (Title 17, CCR, sections 94520-94528) on March, 1995 which placed limits on 35 categories of aerosol coating products. During the same rulemaking, the ARB also adopted amendments to the ACP to make it possible to "bubble" emissions from aerosol coating products.

The Board approved several amendments to the consumer products regulation (mid-term measures) after a July 24, 1997, public hearing. At that time, the commitment in the 1994 SIP was partially met with the approval of VOC limits for 18 new categories of consumer products.

On November 13, 1997, the Board approved the second voluntary regulation, the hairspray credit program regulation. The hairspray credit program and related amendments provide for a market-based emission reduction credit program for both credit generation from hairsprays and credit use within the consumer products arena. The hairspray credit program is contained in Title 17, CCR, sections 94560-94575.

On November 19, 1998, the Board adopted amendments to the aerosol coatings regulation; the consumer products regulation; and the antiperspirant and deodorant regulation. The amendments modified the December 31, 1999, VOC limits in the aerosol coatings regulation, and the effective dates for these VOC limits. Minor changes were also made to the definitions and administrative requirements in the aerosol coatings regulation.

The ARB evaluated aerosol adhesive manufacturers' progress towards meeting the 25% VOC standard in 1996. The ARB determined that manufacturers could not meet the VOC standard without reformulating with methylene chloride. In addition, manufacturers indicated that other low VOC technologies were too costly and not commercially feasible. Accordingly, in 1996 the Board extended the compliance date for the 25% VOC standard from January 1, 1997, to January 1, 2002, to allow more time for manufacturers to comply with the standard without using methylene chloride.

In December 1998, the California Air Pollution Control Officers Association finalized a determination of reasonably available control technology and best available retrofit control technology (RACT/BARCT) for adhesives and sealants. The determination was made to comply with the California Clean Air Act requirements governing the inclusion of RACT/BARCT control technology in district air quality plans (CCR sections 40918-40920). The RACT/BARCT determination includes a 25% VOC limit for aerosol adhesives, effective January 1, 2002. However, it is noted in the determination that the future 25% VOC limit should consider the results of the ARB's technical assessment.

### **C. Regulating Toxic Air Contaminants in Consumer Products**

The ARB has previously addressed toxic compounds in consumer products. In 1989, the Board adopted the antiperspirant and deodorant regulation, which prohibited the use of any TACs in these products.

In 1995, the ARB, regulated methylene chloride by treating this compound as a VOC in aerosol coating products. Also, in 1996 and subsequent revisions in 1997 and 1999, the Board approved provisions to the consumer products regulation to include reporting requirements on the use of perchloroethylene and methylene chloride from all products covered by the consumer products regulation. In 1998, the ARB added new provisions to the aerosol coating products regulation to prohibit any new uses of perchloroethylene.

At the upcoming Board meeting scheduled for April 2000, the ARB will consider a proposed ATCM to prohibit the use of methylene chloride, perchloroethylene and trichloroethylene, in aerosol brake cleaning and other automotive products.

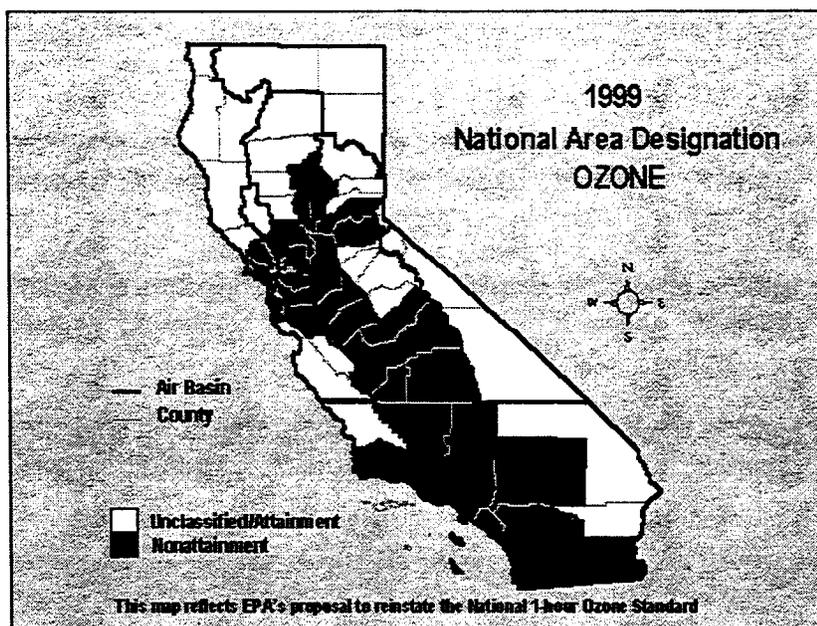
#### **D. The State Implementation Plan (SIP)**

California continues to violate the State and federal ozone standards. As shown in Figure III-1, most of the State does not meet the federal ozone standards. California's plan for achieving the federal ozone standard is contained in the California SIP that was approved by the Board in 1994. The 1994 SIP for ozone projects that an 85 percent reduction in consumer products emissions (from the 1990 baseline year) is necessary to attain the federal ozone standard in the South Coast Air Basin by 2010.

The consumer products component of the SIP, approved by the Board on November 15, 1994, is a multi-faceted program comprised of "near-term," "mid-term," and "long-term" control measures. Under the SIP, the various control measures were anticipated to reduce emissions by 30 percent from the near-term measures, 25 percent from the mid-term measures, and 30 percent from the long-term measures. The near term measures are composed of the antiperspirant and deodorant regulation, the consumer products regulation and the ACP. Aerosol adhesives are part of the consumer products regulation.

On November 15, 1994, the ARB submitted the consumer products Phase II regulations to the United States Environmental Protection Agency (U.S. EPA) for approval as a SIP revision. On January 13, 1995, the U.S. EPA found the submittal complete, and approved the regulations on February 14, 1995. The U.S. EPA's approval of the consumer products regulation was published in the Federal Register on August 21, 1995.

**Figure III-1  
Federal Ozone Non-attainment Areas**



During the 1996 rulemaking to delay the 25% VOC standard for aerosol adhesives, the ARB determined that the delay would result in a SIP VOC reduction shortfall of 0.2 TPD in 2002. However, the ARB also accounted for this shortfall through additional emission reductions from other aerosol coating product categories not contained in the SIP

### **E. Comparable Federal Regulations**

On September 11, 1998, the U.S.EPA promulgated a national consumer products regulation, the "National Volatile Organic Compound Emission Standards for Consumer Products (40 CFR Part 59, Subpart C, sections 59.201 et seq.; see the September 11, 1998, Federal Register, Vol. 63, No. 176, pages 48819-48847)." This action promulgates national VOC emission standards for 24 categories of consumer products. The rule became effective on September 11, 1998. There are similarities and differences between the California and national consumer products standards. The national standard for aerosol adhesives is the same as the existing 75% VOC standard in California. The national rule does not preclude states from adopting more stringent standards.

Although the national consumer products regulation is similar in many aspects to the California regulation, it is less effective in reducing VOCs. The national regulation does not include second tier standards, mid-term measure categories, or aerosol coatings. The national standards are projected to achieve a 20% VOC emission reduction, while California's existing consumer product and aerosol coatings standards would achieve a

40% VOC emission reduction. Additionally, the federal consumer products regulation does not apply to toxic compounds.

## IV. DISCUSSION OF AEROSOL ADHESIVES

The use, composition, and emissions of aerosol adhesives are discussed in this chapter.

### A. Aerosol Adhesives Use

Aerosol adhesives are used in both consumer and industrial markets. These adhesives are commonly used for arts and crafts, graphic arts, automotive bodywork, upholstery, construction, silk screening, floral bouquets, embroidery, industrial assembly line work, and packaging. In the past, aerosol adhesives were mainly sold through industrial distributors. Small quantities were also sold to consumers through neighborhood hardware stores. With the introduction of large discount home improvement centers, aerosol adhesives are now sold in high volume within the consumer market.

Aerosol adhesives can be categorized into two types based on spray patterns: mist and web. Mist type adhesives produce a uniform pattern of discrete particles and are specifically formulated for use on lightweight materials for both repositionable and permanent bonding. Web sprays, on the other hand, are designed with very little atomization to produce a non-uniform lace-like or cobweb-type pattern and are specifically formulated to permanently bond porous substrates and provide gap-filling properties.

Although more expensive than liquid adhesives, aerosol adhesives have certain advantages. Aerosol adhesives have fast drying solvents, which enable the adhesive to bond quicker. They are hand-held, which allows for portability. Because they are self-contained, no applicator, or clean-up equipment is required. For low use and field operations, they can be more cost-effective and more convenient to use.

### B. Composition

Aerosol adhesives are primarily solvent-based. Solvent-based aerosol adhesives consist primarily of propellants (which exist in an equilibrium state between the gaseous and liquid forms), a mixture of solvents, and active ingredients (mainly solids). In actuality, all of the ingredients except the gas phase propellant are in a single homogeneous phase after the product is shaken to evenly distribute the solids. Generally, a balance of fast and slower evaporating solvents is used, with a larger proportion of fast evaporating solvent. Each of the components, active ingredients, solvents, and propellants, are discussed below.

#### *Active Ingredients:*

The active ingredients are highly proprietary. They consist of rubbers, tackifying resins, and additives. Rubbers are long-chained polymers that provide elasticity. Rubbers typically used in aerosol adhesives are styrene-isoprene-styrene, styrene-butadiene-styrene, styrene-butadiene, ethylene vinyl acetate, and neoprene. Tackifying resins are

long-chained polymers that combine with rubbers to give the adhesive its stickiness. Typical tackifying resins are rosin esters, hydrocarbon resins, and terpene resins. Additives are added to aerosol adhesives in small quantities to produce desired characteristics. Common additives are antioxidants, plasticizers, heat stabilizers, and end block protectors. End blockers are special chemicals added to aerosol adhesives to maintain the integrity of the polymer molecule chains.

#### *Solvents:*

The solvent acts as a carrier for the active ingredients by solubilizing and carrying the active ingredients dispersed or dissolved among the solvent molecules. Strong solvents are generally required to solubilize the solids. Solvents used in aerosol adhesives have been continually evolving.

In the past, methylene chloride was a commonly used solvent. Methylene chloride is an excellent solvent, and is considered a non-VOC, or exempt compound. However, methylene chloride is toxic. In 1987, the Consumer Product Safety Commission (CPSC) established a labeling guidance for products containing methylene chloride. The CPSC considers such products to be hazardous substances under the provisions of the Federal Hazardous Substances Act and requires a warning on the label.

Methylene chloride is also considered to be a toxic air contaminant by the ARB and a hazardous air pollutant by the U.S. EPA, pursuant to section 112(b) of the federal Clean Air Act Amendments of 1990 [42 U.S.C. section 4712(b)]. In addition, the OSHA set stringent standards and medical surveillance requirements for occupational exposure to methylene chloride. The OSHA standards will be fully implemented by April 2000. Thus, adhesive manufacturers are evaluating alternative solvents to formulate their products.

1,1,1-trichloroethane (TCA) is also an excellent solvent and an exempt compound. However, TCA is being phased-out under the Montreal Protocol on Substances that Deplete the Ozone Layer, as amended in June 1990 and November 1992, and under Title VI of the federal Clean Air Act. Manufacturers began phasing TCA out of their formulations in the early 1990s.

More recently, adhesive manufacturers have been experimenting with blends of acetone and VOC solvents such as hexane, heptane, and toluene. Since acetone is an exempt compound, formulations with acetone have the benefits of lower VOC levels without toxicity or ozone depleting problems. However, acetone has some limitations in product formulations due to the solubility of the active ingredients, and its damage to certain substrates. Manufacturers' progress in formulating with acetone is discussed further in Appendix F.

*Propellants:*

Propellants are used to expel or apply the adhesives from the can. There are several types of propellants available: liquid hydrocarbons (VOCs), compressed gases, and hydrofluorocarbons. Liquid hydrocarbons are generally used as propellants for aerosol adhesives. Manufacturers prefer to use liquid hydrocarbons because they are inexpensive, and more soluble in the solvent. The increased solubility allows the propellant to aid in the atomization of the spray and to maintain an even pressure throughout the life of the product. Manufacturers typically use blends of propane, butane, and isobutane, to meet specified vapor pressures. Dimethyl ether, though more expensive, is often used in formulations to keep the mixture solubilized.

### **C. Previous Product Surveys and Emissions**

The ARB conducted three previous surveys for aerosol adhesives. Surveys were conducted for sales of consumer and institutional and industrial products for years 1990 and 1995. Products that were considered "industrial only", as well as products weighing more than one pound, were excluded from the survey. The surveys were conducted to gather information to calculate emissions and to determine the status of research and development efforts to reduce VOC emissions. A third survey was conducted for 1997 sales as part of the 1997 Consumer and Commercial Product Survey for Mid-term Measures II.

The 1990 survey data were used to develop the Phase II limits. The survey category for adhesives was called "household adhesive and sealant." About one-third of the products reported in this category were formulated for use as sealants. Twenty-one companies reported sales of 65 products for aerosol household adhesives and sealants. Total sales reported were about 310 TPY and total VOC emissions calculated were about 150 TPY.

The 1995 survey data were used to develop the recommendations in the 1996 status report to the Board. Nine companies reported sales of 46 products. Total sales reported were about 240 TPY and total VOC emissions calculated were about 160 TPY.

The third survey was conducted for 1997 sales in anticipation of the statutory-required technical assessment. However, staff later determined that the 1997 survey did not meet the full survey requirements specified in the consumer products regulation. Hence, the staff sent out another survey for 1998 product sales and research. From this survey, staff identified 136 products, which totals about 1040 TPY in sales and about 700 TPY in VOC emissions.



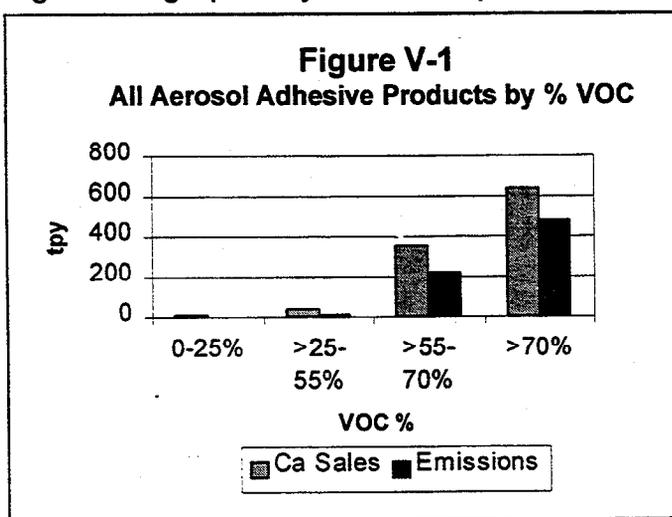
## V. EVALUATION OF THE AEROSOL ADHESIVE VOC STANDARD

The consumer products regulation requires the Board to prepare a study on the feasibility of establishing a standard(s) more stringent than the present 75% VOC standard. As discussed in Chapter III, the Board adopted the 75% VOC standard in 1992, but also adopted a second tier standard of 25% VOC, which was later modified to become effective 2002. As part of the evaluation, ARB staff surveyed aerosol adhesive manufacturers and private label companies to gather information on product sales, formulations, and research and development efforts. A copy of the survey package is included in Appendix D. The sales and emissions information was compiled and evaluated. A detailed staff analysis of the 1998 product survey database is included in Appendix E. The manufacturer's research and development efforts were also surveyed and was supplemented with additional information gathered from phone calls, letters, and workshops. Details on the research and development efforts are included in Appendix F.

### A. 1998 ARB Aerosol Adhesives Survey

In March 1999, staff mailed a survey to manufacturers and other responsible parties to gather information on product sales and formulations and on research and development efforts to produce lower VOC products. In general, staff used the existing consumer products survey mail list as the basis for the aerosol adhesives survey. The list was expanded with names found from shelf surveys, the Internet, and from end users. After compiling the survey results, staff provided survey summaries showing company and product listings, the breakdown of sales and emissions by adhesive type, and VOC ranges and averages.

A total of 47 companies submitted information on sales of aerosol adhesives in California. There are a total of 136 products with about 1040 TPY of associated sales, about 700 TPY of VOC emissions, and about 18 TPY of methylene chloride emissions. The overall average ratio of methylene chloride to VOC solvent use was 3 percent. Figure V-1 graphically shows the product distribution in TPY of sales and emissions by



VOC level for all products. With the exception of gasket adhesives, formulations of products with less than 55 percent VOC contained methylene chloride, perchloroethylene, or water. Of the product formulations less than 55% VOC, gasket adhesives made up only about 24 percent of the product sales.

The sales results were reported according to the following categories: mounting, high performance, repositionable, and general purpose.

In discussions with industry, it became apparent that if necessary, the categories could be simplified to facilitate the development of new standards.

The NPCA proposed a new system of categorizing aerosol adhesives based on three categories: special purpose, general mist, and general web. Staff has revised the categories general mist and general web to mist and web to remove any ambiguity associated with the term "general" as it applies to product labels versus product VOC limits. The web and mist categories refer to spray type. A mist spray is a fine particle, evenly distributed spray; and a web spray is a non-uniform, heavy spray. The proposed special purpose category applies to adhesives formulated specifically for permanent mounting of artwork, repair and edge bonding of countertop laminates, automotive headliners, polyethylene sheeting, flexible vinyl, and polystyrene foam. The categories are discussed in detail in Chapter VI.

Table V-1 shows the product distribution based on the NPCA proposed categories segregated according to products with and without methylene chloride, perchloroethylene, and trichloroethylene. The product grouping does not reflect how companies plan to market their products. Instead it represents the number of products, based on the product survey and product labels, indicating these products have special purpose characteristics. Although all manufacturers have not determined their marketing plans for the proposed categories, they state that their products marketed under the special purpose category should account for about 20 percent of their product sales. They also state that products marketed under the special purpose category would adhere to strict labeling requirements that would limit market appeal to a specific end user. Therefore, staff expects the final mix to have fewer products in the special purpose category than is shown in Table V-1.

**Table V-1  
Product Distribution by Category**

Category	Number of Products	Sales (tpy)	Emissions (tpy)	VOC Range (%)	Wt-Avg VOC (%)
<b><i>Without MeCl/Perc/TCE*</i></b>					
Mist	25	444	321	29-92	72
Web	13	41.1	26.4	43-95	64
Special Purpose	65	519	344	0-89	66
<b><i>With MeCl/Perc/TCE*</i></b>					
Mist	10	1.9	0.6	19-44	29
Web	7	15.3	4.8	21-40	31
Special Purpose	16	17.1	6.0	26-75	35

\*Methylene chloride, Perchloroethylene, and Trichloroethylene are abbreviated as follows: MeCl, Perc, TCE.

It is interesting to note that while the 33 products formulated with methylene chloride, perchloroethylene, or trichloroethylene represent about 25% of all products reported, sales of these products comprise only about 3 percent of the total aerosol adhesives sales.

### **B. 1999 Technology Assessment**

In 1996, staff conducted a technology assessment of aerosol adhesives and identified several potential methods for reducing VOC concentrations in aerosol adhesives. In the 1998 product survey, staff gathered additional information on research and development efforts to reduce the VOC content in aerosol adhesives. Manufacturers reported their findings for various technologies. Staff followed up with phone calls and industry meetings to supplement the information in the survey responses. The following sections discuss staff's 1999 technical assessment, present day formulations, and manufacturer's research and development efforts. Details on staff's technical assessment are found in Appendix F.

### **C. Present Formulations**

Aerosol adhesives are composed of active ingredients, which are mainly rubber and resin solids; solvents; and propellants. The weighted-average solvent and propellant contents reported in the survey were 39 percent and 36 percent, respectively. All VOC components are found in the solvent and propellant portions of the formulation. Typical VOC solvents are pentane, hexane, cyclohexane, heptane, and aromatic hydrocarbon compounds such as toluene and xylene. Typical VOC propellants are propane, butane, isobutane, and dimethyl ether. Both non-VOC and exempt compound solvents and propellants are available in the marketplace. Substitution of the VOC components with alternative components is the easiest way to achieve reductions in VOC content.

## **D. Research and Development Efforts**

### **1. Solvents**

In the 1996 technical assessment, staff found that the only formulations that met the 25% VOC standard were those formulated with methylene chloride. However, manufacturers have begun to slowly phase-out methylene chloride use because of government regulations and customer preference for non-chlorinated formulations. Labels now commonly advertise "non-chlorinated" formulations. Several manufacturers have stated that they would not pursue this solvent technology because of its toxicity, and ARB staff is not considering its use as a reformulation option.

Manufacturers have been studying alternative exempt compounds or non-VOC solvents. In the 1998 survey, manufacturers were asked for their assessment on the use of water, acetone, methyl acetate, parachlorobenzotrifluoride, and volatile methyl siloxanes.

Several companies tested prototype water-based formulations. One company even commercially marketed a water-based formulation. However, manufacturers could not overcome problems inherent to water-based formulations. The major problems associated with water-based formulations are freeze/thaw stability and long drying time. Freeze/thaw stability is the ability to remain stable after undergoing periods of freezing temperatures. The company that produced the commercial formulation had to manufacture and ship the product in warm temperatures. The company also had to instruct users on how to apply the adhesive since water-based adhesives are less forgiving when applied incorrectly. The second factor, drying time, is very crucial to production operations; a longer drying time slows down production time. Recently, the only manufacturer of a water-based aerosol adhesive has discontinued its production due to the manufacturing and application problems discussed above.

Many manufacturers have been experimenting with acetone substitution. Acetone is a fast drying solvent that is now widely used in aerosol adhesives. Acetone is also reasonably priced and has an acceptable odor. However, manufacturers have experienced incompatibility with the rubbers/resins at high concentrations. The maximum content of acetone tolerability in the solvent mixture is about 50 percent. Currently, formulations are not at their maximum and manufacturers believe that they can increase the concentration of acetone to some degree. Other issues that can limit the full use of acetone are its tendency to attack polystyrene foam and its tendency to form wetter bonds. The issue involving attack on polystyrene can be minimized by altering the formulation to make the solvent evaporate faster (less soak-in) or to add a slow evaporating component that remains on the surface until the acetone evaporates. Adjustments can also be made to extending the distance between the can and the substrate during application. Longer distances allow much of the acetone to evaporate before reaching the surface. Also, allowing the surfaces to dry adequately allows the acetone to evaporate before becoming trapped into the adhesive bond.

Methyl acetate is chemically similar to acetone, but is more expensive. Thus, manufacturers have not invested much time into reformulating with this compound.

Several companies have also tested parachlorobenzotrifluoride (PCBTF). This compound is an exempt compound. Parachlorobenzotrifluoride, which is similar to toluene, can often substitute for toluene and other aromatics. Unfortunately, there are only about 30 formulations containing aromatic compounds. One manufacturer said that aromatics are not suitable for aerosol adhesive formulations because they are slow drying and because some aromatics are Proposition 65 compounds. If aromatic compounds are used, they are typically used in concentrations less than 5 percent of the total formulation. Thus, the use of PCBTF would not result in significant reductions. Another drawback is the price of PCBTF, which is 14 times more costly than toluene. Nevertheless, there is one commercially available product that is formulated with PCBTF.

Two other solvents, volatile methyl siloxanes (VMS) and t-butyl acetate were also reported. VMS fluids are low molecular weight silicone fluids. They are low in toxicity and almost odorless. Companies responded that the evaporation rate is too slow, the solubility is poor, and the cost is high. While specific information on t-butyl acetate was not requested in the survey, staff requested information on this compound from companies after the survey was mailed. Manufacturers reported that this compound is also slow drying, had poor solubility, and had an unacceptable odor.

## 2. Propellants

Manufacturers were asked to report on their findings on the use of HFC-152a and compressed gas propellants. Hydrofluorocarbon-152a is a non-VOC, non-ozone depleting propellant that can replace part of the hydrocarbon propellants currently used in aerosol adhesives. The vapor pressure and molecular weight of this compound is similar to that of hydrocarbon propellants. This compound is used as a propellant in hair sprays and mousses. However, in aerosol adhesives, the only formulation in the 1998 inventory using HFC-152a is the one water-based formulation. Companies reported high cost compared to the cost of VOC propellants and incompatibility with adhesive rubbers and resins. Also, HFC-152a, when formulated with products containing acetone, requires the content of acetone to be reduced to maintain product stability. Hydrofluorocarbon-152a can make up 5-15 percent of the formulation.

Compressed gas propellants such as nitrogen and carbon dioxide have been used successfully in aerosol products for many years. However, they are not used in aerosol adhesives. Manufacturers reported that aerosol adhesives work better with a gas that can also serve as a solvent, such as hydrocarbon propellants (propane, butane, and dimethyl ether). Aerosol adhesives need a steady pressure to deliver a constant spray pattern. Also, because these gases would comprise such a small percentage of the contents of the can, their presence would not lower the VOC contents much and they do not contribute much to drying the adhesive during delivery. Even if compressed gases could deliver a constant spray pattern throughout the life of the product, the VOC

reductions would be minimal because the compressed gas would comprise a very small percentage of the formulation compared to soluble propellants.

### **3. Other Technologies**

Two other technologies reported were high solids and hardware modifications. These are two methods that work together to produce a lower VOC product. By increasing the solids content of the formulation, the solvent portion is automatically reduced. However, the higher solids content increases the viscosity of the formulation which leads to problems with product dispensing. Hardware modifications would help to overcome the problems associated with high viscosity. Manufacturers in general have reported that high solids alone will produce minimal reductions in VOC, increased viscosity, and poor spray pattern. Manufacturers have found that they can combine high solids with acetone substitution to maximize VOC reduction potential. One company has successfully used high solids combined with acetone substitution and hardware modifications to reduce VOC content by over 10 percent and expects to achieve even further future reductions.

The use of high solids formulations is more costly because polymers and resins tend to cost more than the solvents they replace. However, even though the price per can may be higher, the coverage per can should be greater. This would help to offset the increased price of the product.

### **E. Findings**

Based on the 1999 technical assessment, staff found that manufacturers will not be able to meet the 25% VOC standard by January 1, 2002, unless they reformulate with methylene chloride. The 25% standard was based on reformulating with water as the solvent. Manufacturers have not been able to formulate an acceptable water-based product.

Staff found that there are presently no other exempt compound solvents that can be used to lower the VOC content to 25%. Methylene chloride is the only readily available solvent that can be used to meet the 25% VOC standard by 2002.

The U.S. EPA has received petitions to review many other solvents for consideration as exempt compounds. To qualify for exempt status a compound must meet low reactivity, low ozone depleting, and low toxicity standards. Manufacturers do not see any compound near exemption status that is suitable as a VOC replacement solvent in aerosol adhesives.

However, manufacturers have existing products that can be reformulated to meet VOC levels lower than the existing 75% standard. Based on the product survey, some products are already at or below a 60% VOC content. Some manufacturers have already taken the lead to optimize the reformulating options discussed earlier, and there

are indications that additional reductions in VOC content can be made for some products.

Staff has determined that it is technologically possible for all aerosol adhesives to meet lower VOC standards than the existing 75% standard. For the aerosol adhesive categories discussed earlier, staff has determined that the following VOC levels in Table V-2 are technologically and commercially feasible.

**Table V-2  
Achievable VOC Levels for Aerosol Adhesives**

Product Category	Weight Percent VOC
Mist Sprays	65
Web Sprays	55
Special Purpose	
Mounting	70
Flexible Vinyl	70
Automotive Headliner	65
Polystyrene Foam	65
High Pressure Laminate	60
Polyolefins	60

Staff has determined that about 80 percent of existing aerosol adhesive products would need to be reformulated to meet these VOC limits. This represents about 75 percent of total product sales. The differences in VOC limit for each category and subcategory is based on the limitations of each reformulation option as they relate to the type of product application. For example, web spray adhesives generally have a higher solids content and, therefore, less solvent. Mist spray adhesives are formulated with more solvent to achieve a lower viscosity level, which aids in delivering a fine mist spray. The additional amount of solvent required would partly consist of VOC compounds. The special purpose categories contain specific performance characteristics that need to be maintained in the product application and require the use of higher VOC levels. For example, some categories cannot tolerate high levels of acetone because of sensitivity to substrate acetone attack. Other categories require special rubbers/resins that are more difficult to solubilize and are incompatible with acetone. The rationale for the proposed VOC limits is discussed in Chapter VI and the detailed 1999 technical assessment is contained in Appendix F.



## VI. DESCRIPTION AND RATIONALE OF THE PROPOSED AMENDMENTS

This chapter describes and provides the rationale for the proposed amendments to the aerosol adhesives standards, which include:

- Elimination of the 2002, 25% VOC standard;
- Recommended VOC limits lower than 75%;
- Add labeling requirements;
- Prohibit the use of certain toxic compounds;
- Requires the submittal of research and product information in 2004 to support a technology assessment;
- Perform other minor revisions.

Staff determined that the proposed new standards constitute BARCT and are technologically and commercially feasible, as required by State law. In developing the proposed amendments, staff relied on the 1998 product survey, an evaluation of recent research and development efforts by manufacturers, and on-going technical discussions with industry. These efforts are detailed in staff's technical assessment contained in Appendix F.

The proposed amendments are discussed below.

### A. Elimination of the 25% VOC Standard

As discussed in Chapter V, staff has determined that the 25% VOC standard is not technologically or commercially feasible, as required by State law. Staff found that the 25% VOC standard can only be met by using methylene chloride or water-based technology. Neither of these technologies are acceptable compliance options. Therefore, staff proposes to eliminate the future 25% VOC limit, which becomes effective on January 1, 2002.

### B. Aerosol Adhesive VOC Limits

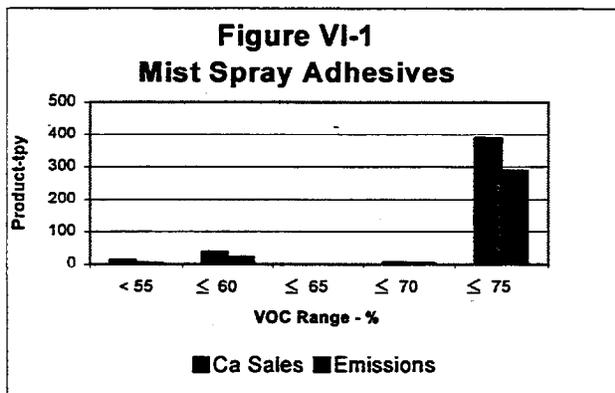
Staff is proposing that three new categories of standards be established consisting of mist, web, and special purpose categories. The proposed VOC limits for these categories are as follows:

<b>Category</b>	<b>Proposed VOC Limits</b>
Mist	65%
Web	55%
Special Purpose:	
- Mounting	70%
- Flexible Vinyl	70%
- Automotive Headliners	65%
- Polystyrene Foam	65%
- High Press. Laminates	60%
- Polyolefins	60%

Staff found that each category is formulated for specific uses of aerosol adhesives. Below is a discussion of the development and rationale for the VOC limits of the proposed categories.

### 1. Mist Sprays

As discussed previously, industry recommended to categorize their aerosol products into three groups. One category consisted of products that are formulated to produce mist sprays. Industry indicated that products in this category are purchased by consumers for their mist properties and are used on many types of substrates and applications. These products are designed for general purpose adhesive use.

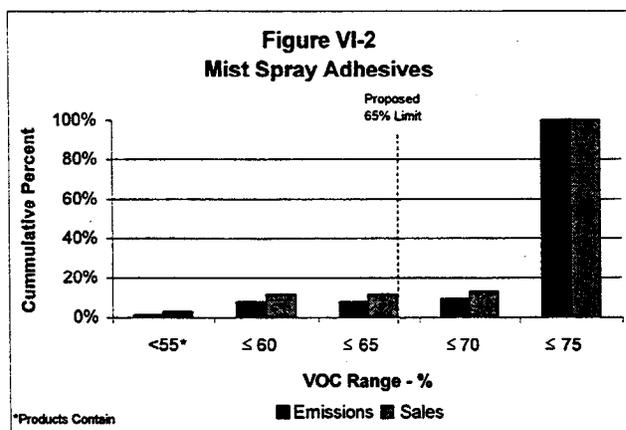


In addressing the mist category, staff evaluated the distribution of products based on their VOC content. Figure VI-1 shows that most mist sprays are formulated above 70% VOC. Some mist sprays contain significantly less VOCs (i.e. less than 55% VOC), but these products are formulated with methylene chloride, perchloroethylene, and/or water. As indicated earlier, staff is proposing a toxics prohibition as part of the amendments, so

products containing methylene chloride would no longer be available. Also, the only water-based product has been recently discontinued due to manufacturing and application problems (see Appendix F for staff's technical assessment).

Staff's discussions with industry indicate that mist sprays are formulated to expel a "dispersion" of adhesive, solvent and propellant. Mist sprays must be formulated with high solvent content to allow for better suspension of the adhesive particles within the can so when the can is shaken and the actuator is depressed, the result will be a fine particle mist with a fairly uniform droplet size distribution. Since many solvents are VOCs, a higher solvent content generally results in a higher VOC content. Therefore, a

higher VOC content is required for these adhesives to maintain the fine-mist properties of this category of aerosol adhesives. These mist properties are needed in the types of general purpose applications that require a smooth and uniform appearance. Staff concurs that with the current limited availability of non-VOC and exempt compound solvents, mist sprays require a threshold level of VOC content to maintain the performance of mist sprays.



Staff is recommending a VOC level for mist sprays at 65% VOC. In evaluating the product distribution, as shown in Figure VI-2, at 65% VOC, complying products comprise about 12% of the marketshare. This means that about 88% of the marketshare would need to reformulate to meet a standard of 65% VOC. Staff estimates that reformulation of these products would provide about 37 TPY of VOC emission reductions. However, 10 products meeting the proposed limit are formulated with

methylene chloride. These products would likely be reformulated with VOC compounds and would result in a small increase in VOC emissions. At a VOC limit of 65%, staff estimates the net VOC emission reductions from this category would be 37 TPY, or about 12% of the emissions from the mist spray category. Also, about 5 pounds per day of methylene chloride emissions would be reduced.

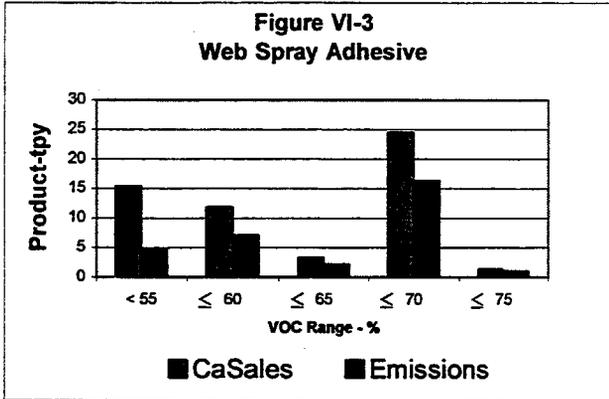
Staff also proposes a definition for mist sprays shown below and is contained in Appendix A.

*“Mist spray adhesive means any aerosol adhesive which is not a special purpose spray adhesive and which delivers a particle or mist spray, resulting in the formation of fine, discrete particles that yield a generally uniform and smooth application of adhesive to the substrate.”*

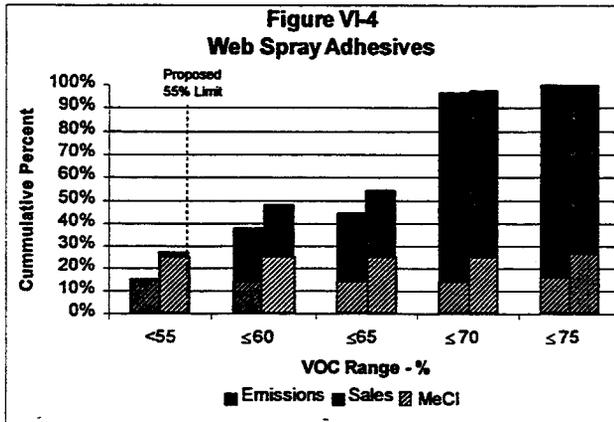
## 2. Web Sprays

The web category proposed by staff consists of products that are formulated to produce a spray pattern resembling a lace or spider’s web pattern. These products are purchased by consumers because they are best suited for particular applications such as bonding large areas and for gap filling. Web sprays are formulated to expel a “solution” of adhesive, solvents and propellant. In the case of web adhesives, the formulation provides for a fairly homogeneous mixture of resins and rubbers, solvents and propellants. When coupled with proper actuator technology, the resulting spray pattern is non-uniform and somewhat characteristic of cobwebs.

Because these products do not require fine atomization of adhesive particles, Industry advised that more flexibility exists to reformulate this category of aerosol adhesives to lower VOC formulations. The web spray adhesive products are mainly used for general adhesive purposes.



The distribution of web spray products, as shown in Figure VI-3, indicates a wider range of VOC formulations than for mist sprays. Figure VI-3 shows that most spray adhesives were formulated to contain between 55 to 70% VOC. Again, the products at or below 55% VOC are formulated with methylene chloride, and these products would no longer be available as a result of staff's proposal to prohibit methylene chloride.



Staff worked with industry representatives, including NPCA and individual companies, to determine what VOC level could be met for these general purpose web spray aerosol adhesives. Based on these discussions, staff is proposing a 55% VOC limit even though no existing product without MeCl meets this level.

Figure VI-4 shows the cumulative amount of product sales and emissions at or below the various VOC levels. As can be seen, about 70 percent of the marketshare would need to be reformulated to a lower VOC level. This would provide about 4 TPY per day of emission reductions. However, about 30 percent of the market share (products formulated at 55% VOC or lower) for this category contains methylene chloride. Reformulating these products with VOC compounds would result in a VOC increase of about 4 TPY. As a result, the proposed VOC limit would only provide about 0.2 TPY of VOC emission reductions, or less than 1% of all web spray category emissions. However, about 8 TPY of methylene chloride emissions would be reduced.

A proposed regulatory definition of web spray shown below and is contained in Appendix A.

*"Web spray adhesive means any aerosol adhesive which is not a mist spray or special purpose spray."*

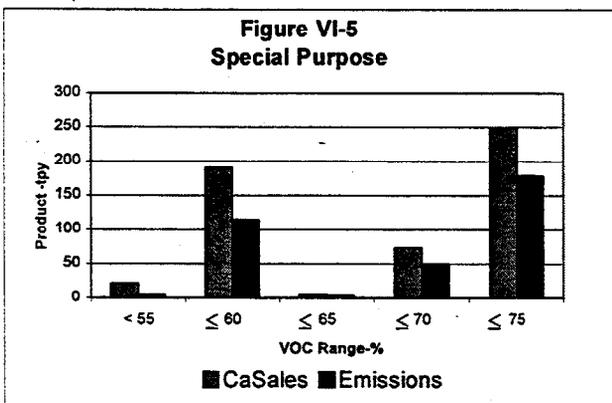
### 3. Special Purpose

The special purpose category includes web and mist sprays that are formulated to perform under extreme temperature, strength or chemical conditions. Staff has found that these products can not be formulated like other general purpose mist and web sprays due to various concerns with substrate integrity and polymer compatibility.

In evaluating aerosol adhesive products that could fall under the special purpose category, staff defined specific groups of aerosol adhesives products that need to be considered. Staff found that products containing acetone can damage certain substrates when acetone comprises a certain threshold level of the formulation. As discussed in our technical assessment, acetone is the main exempt solvent used by manufacturers to reformulate to lower VOC levels. Staff also found that some substrates or mounting articles can only tolerate limited amounts of acetone. Also, staff found that certain applications can fail when exposed to extreme temperatures and chemical attack from plasticizers found in substrates or bonded material.

From this evaluation, staff was able to define six distinct subcategories under the special purpose category. These subcategories include: mounting, flexible vinyl, automotive headliners, polystyrene foam, high pressure laminates, and polyolefins.

From the product survey and product labels, staff placed products that indicated special purpose characteristics into this category. Figure VI-5 illustrates the product sales and



emissions according to their VOC content range. As shown, about half of the special purpose products fall between 60 to 70% VOC, and account for about 50% of the sales and about 45% of the emissions for this category. Also, the sales and emissions from this category represent 56% of sales and about 50% of emissions from all categories of aerosol adhesives.

It should be emphasized that staff's placement of these products in the special purpose category is likely overestimated since many of these products would ultimately be marketed as general purpose products. At this time, staff does not have information to estimate how all these products would be marketed under the proposed categories. Manufacturers have stated that their specific marketing plans have not been developed, but they estimate that their products marketed as special purpose would be about 20 percent of their total product sales.

**Mounting and Flexible Vinyl (70% VOC Limit)*****Mounting:***

This category of adhesives includes specialized formulations, which are used to permanently or temporarily bond sensitive art materials such as paper and photographic stock. In addition, these products are often required to be acid free and non-yellowing to ensure adequate archival performance. In general, these products are mist sprays and are either used for photographic work, or for repositionable mounting work (such as ad agency presentation boards, etc.). The adhesives are generally applied in a light even distribution of adhesive to preclude visual detection.

Staff has found that these products are generally formulated with high VOC levels to address the performance characteristics discussed above. However, in discussions with industry, staff found that the critical application, which need these characteristics, are limited to permanent mounting of photographic stock and artwork that are sensitive to high levels of acetone. In evaluating the product database for these products, staff has identified only 4 products that fall within the criteria and three of them are formulated above 70% VOC. Industry agrees that these products could be formulated to 70% VOC with no degradation of performance. Therefore, staff proposes 70% VOC as the appropriate standard for mounting adhesives.

***Flexible Vinyl:***

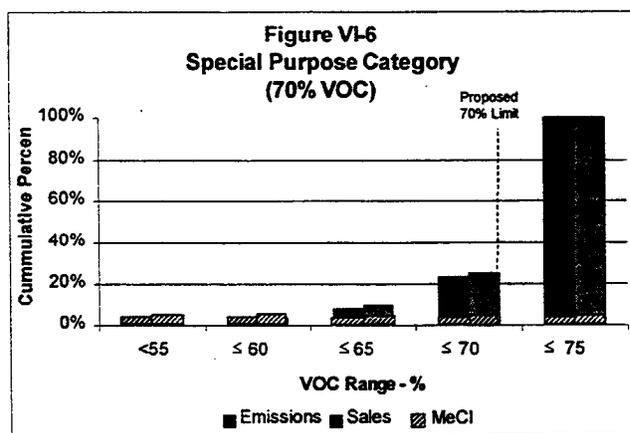
This category of adhesives is predominantly web sprays and are used to bond flexible vinyl materials and leather to various surfaces.

As a result of staff's evaluation, it was determined that aerosol adhesives specifically formulated for use on flexible vinyls (and leathers for automotive applications) require higher VOC formulations. The adhesives used on flexible vinyl and leather are required to contain certain adhesives that are resilient to plasticizers. Plasticizers are release agents, which are used to ensure softness and material pliability. However, these same agents eventually migrate to the top surface where they act to release the adhesive bond. Leather materials used in automotive applications generally contain oils that can interfere with proper adhesive bond formation.

To counteract the effect of plasticizers, aerosol adhesive manufacturers typically use higher molecular weight rubbers and resins. The denser adhesives require more solvents to be dissolved. Staff found that the flexible vinyl adhesives are also used for automotive repair uses, such as bonding vinyl roofs. Therefore, flexible vinyl adhesives are also required to have high strength and high temperature resistance.

Because lower density adhesives are not currently available which can meet the stringent demands of these adhesives, staff proposes a 70% VOC level for this category to allow more solvent, which ensures adequate solvency.

Based on the product survey, flexible vinyl aerosol adhesives are formulated between 60 to above 70% VOC. One product was below 55% VOC, but contained methylene chloride and would no longer be available under staff's proposed prohibition on methylene chloride.



#### *Marketshare and Emissions (70% VOC Limit):*

From the product survey, staff grouped all products that indicated mounting and flexible vinyl applications. Figure VI-6 illustrates both the product sales and emissions according to their respective VOC content range. As can be seen from the figure, about 75 percent of the market share in this category does not meet the proposed limit. Reformulation of these products would provide about

0.2 TPY of VOC emission reductions. However, complying products containing methylene chloride would need to be reformulated and could result in a VOC increase of about 0.2 TPY. As a result, there is no net decrease in VOC emissions from this category. Also, methylene chloride emissions would be reduced by a small amount.

#### **Automotive Headliner and Polystyrene Foam (65% VOC Limit)**

##### *Automotive Headliners:*

While staff was developing the subcategory list within the special purpose adhesive, industry suggested that headliner adhesives met the definition of special purpose and pointed out that these adhesives should be considered separately. They indicated that several of their products have been specifically formulated to bond automotive headliners. Headliner applications may involve bonding either lightweight materials (e.g. fabrics and foams), or heavier materials (e.g. foam insulation, fiberboard, leather and supported vinyl) to the interior roof of automobiles. Since the ARB survey did not specifically request the identification of automotive headliner adhesives, the staff collected this information from product labels. For products where staff did not have labels, staff contacted companies to verify whether the product can be used for headliners.

Staff found that headliner adhesives require the use of strong, heat resistant rubbers and resins. Automotive headliner adhesives are exposed to temperatures of at least 160 °F, and are used to bond various media (fabrics, plastic, metal surfaces) thereby requiring high strength and plasticizer resistance as well.

In the product survey, headliner adhesives were all classified as web sprays ranging between 60 to over 70% VOC. One product containing methylene chloride was formulated to below 55% VOC. Based on discussions with the NPCA, staff has

determined that it is possible to reformulate these adhesives to a 65% VOC level. About one-third of the products identified as headliners were found to be formulated below 65% VOC. Therefore, staff proposes to limit adhesives used for automotive headliner installation to 65% VOC.

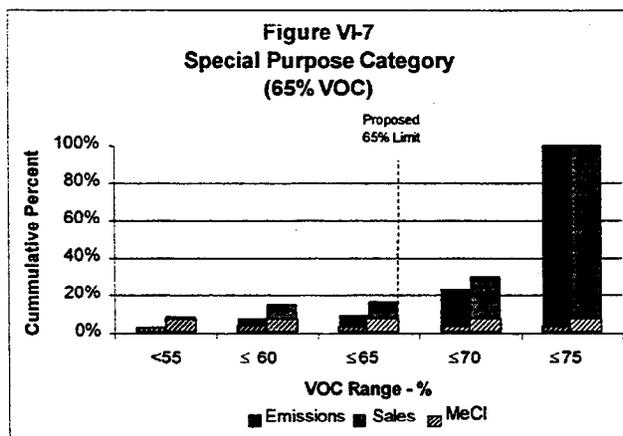
*Polystyrene Foam:*

This special purpose subcategory contained several adhesive products. These adhesives are used to bond expanded polystyrene foam (i.e. EPS, beadboard, etc.), and Styrofoam<sup>®</sup>, and are formulated for high strength and substrate compatibility. There was a fairly even distribution of products categorized as either mist or web sprays. Staff found that most users of these products either use the products for assembling packaging materials, for arts and crafts, or for home construction projects.

Staff's survey indicated that several products were formulated for polystyrene foam applications, with a wide range of formulations between 55% to over 70% VOC. The products at or below 55% VOC were typically formulated with methylene chloride. Products above 70% VOC were mist sprays and the web spray products were formulated between 55 to 70% VOC.

Some of these adhesives were formulated with acetone as the solvent component. Acetone was found to partially dissolve some of the lighter density polystyrene materials, which limits the amount of acetone that these products can contain. Upon further investigation by staff, it was also determined that the problem of "substrate attack" was also caused by the way in which these products are applied. Evidently, when these products are applied in close proximity to the substrate, the effects of "substrate attack" are aggravated.

Based on the ARB survey and through discussions with industry, staff found that when products are formulated to low levels such as 55% VOCs, manufacturers tend to use higher acetone levels, which further exacerbates the problem of substrate incompatibility. However, industry indicated that it was possible to reformulate polystyrene foam aerosol adhesives to below 65% VOC with little or no substrate attack. Any concerns of substrate attack at 65% VOC could be mitigated by better instructions on the label to preclude misapplication. Industry concurred with staff's findings as well. Therefore, staff proposes to limit polystyrene foam adhesives to under 65% VOC.



**Marketshare and Emissions (65% VOC Limit):**

For this subcategory, staff grouped automotive headliner and polystyrene foam adhesives. Figure VI-7 illustrates both the product sales and emissions according to their respective VOC content range. Excluding products formulated with MeCl, about 16 percent of the sales for these products are formulated below 65% VOC. Therefore,

about 84 percent of the marketshare for the products in this category would need to be reformulated to meet a 65% VOC limit. The VOC emission reductions associated with reformulation of these products is about 12 TPY. However, 11 products in this category contain toxic compounds. The emission increase from reformulating these products would result in a VOC increase of about 5 TPY. Therefore, staff estimates that at the proposed 65% VOC limit, total VOC emission reductions would be about 7 TPY for this category. Also, about 8 TPY of methylene chloride emissions would be reduced.

**High Pressure Laminates and Polyolefins (60% VOC Limit)**

***High Pressure Laminates:***

Another specialized group of aerosol adhesives are designed for use on high pressure laminates. High pressure laminates (HPL) are thin hard plastics manufactured into sheets and are typically rolled up for shipment. These sheets are used to cover tables, desks, workbenches, etc. The adhesives used are required to have enough strength to resist the tendency for the HPLs to roll up on themselves. The HPL adhesives must be fast bonding and able to withstand the abuse of impact or being brushed up against by people or objects.

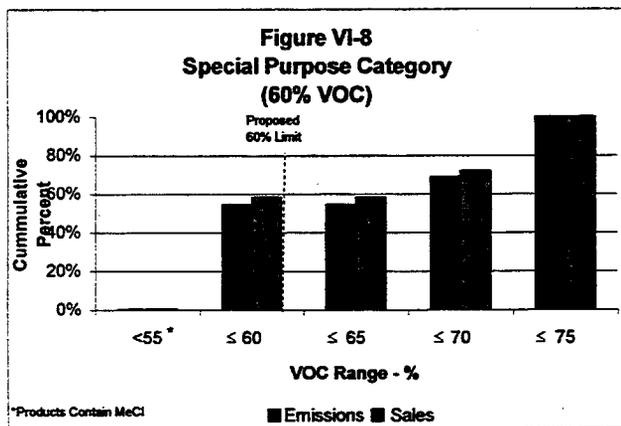
From the product survey, staff found that virtually all the aerosol adhesives for this category were web sprays formulated between 55% to 70% VOC. The formulations at or below 55% were formulated with methylene chloride, while the formulations above 60% did not contain any toxic compounds. There were also three products formulated at slightly below 60% VOC that did not contain methylene chloride.

Staff has found that these aerosol adhesives can be formulated at 60% VOC and still maintain the high performance characteristics of this product category. Therefore, staff proposes to limit the VOC content of this subcategory to 60%.

### Polyolefins:

Polyolefins are a group of plastics including polyethylene and polypropylene. These materials exhibit very low surface energy with little or no attraction for adhesives. Therefore, the adhesive resins and rubbers must be formulated to compensate for the low energy substrates. Staff found that most of these products consisted of web sprays and were labeled as recommended for construction and asbestos abatement.

Based on the products database, staff found that these products were formulated between 55% to 70% VOC. Staff found that some of the products in this category were formulated to 60% VOC, and industry confirmed that this level could be met by all adhesives in this subcategory. Therefore, staff recommends a 60% VOC limit for polyolefins.



### Marketshare and Emissions (60% VOC Limit):

From the product survey, staff grouped products that indicated high pressure laminates and polyolefin applications. Figure VI-8 illustrates both the product sales and emissions according to their respective VOC content range. As shown, to meet the proposed limit, about 40 percent of the marketshare in this category would need to be reformulated. Staff estimates that reformulating these

products will provide about 12 TPY VOC emission reductions. However, 3 products in this category contain toxic compounds. The emission increase from reformulating these products would result in a VOC increase of about 0.4 TPY. Therefore, the net VOC emission reduction for this category is about 12 TPY. Methylene chloride emissions would be reduced by about 0.7 TPY.

### Special Purpose Definition

The proposed regulatory definition of special purpose adhesives is shown below and is contained in Appendix A.

*Special purpose spray adhesive" means an aerosol adhesive that meets any of the following definitions:*

- (A) "Mounting adhesive" means an aerosol adhesive designed to permanently mount photographs, artwork, and any other drawn or printed media to a backing (paper, board, cloth, etc.) without causing discoloration to the artwork.

- (B) *“Flexible vinyl adhesive” means an aerosol adhesive designed to bond flexible vinyl to substrates. Flexible vinyl means a nonrigid polyvinyl chloride plastic with at least five percent, by weight, of plasticizer content. A plasticizer is a material, such as a high boiling point organic solvent, that is incorporated into a vinyl to increase its flexibility, workability, or distensibility, and may be determined using ASTM Method E260-91 or from product formulation data.*
- (C) *“Polystyrene Foam Adhesive” means an aerosol adhesive designed to bond polystyrene foam (e.g. Styrofoam®, expanded polystyrene foam, etc.) to substrates.*
- (D) *“Automobile Headliner Adhesive” means an aerosol adhesive designed to bond together layers in motor vehicle headliners.*
- (E) *“Polyolefin Adhesive” means an aerosol adhesive designed to bond polyolefins (e.g. polyethylene, polypropylene, etc.) to substrates.*
- (F) *“High Pressure Laminate Adhesive” means an aerosol adhesive designed for the touch-up, repair, or edgebonding of high pressure laminates. For the purposes of this definition “high pressure laminate” means sheet materials which consist of paper, fabric, or other core material that have been laminated at temperatures exceeding 265 degrees F, and at pressures between 1,000 and 1,400 psi.*

### **C. Labeling Requirements**

In order to qualify as a “Special Purpose Spray Adhesive” the product must meet one or more of the “Special Purpose Spray Adhesive” definitions. However, if the product label indicates that the product is suitable for use on any substrate or application not listed under the “Special Purpose Spray Adhesive” definition, then the product shall be classified as either a “Web Spray Adhesive” or a “Mist Spray Adhesive.”

If a product meets more than one of the definitions specified as “Special Purpose Spray Adhesive” and is not classified as a “Web Spray Adhesive” or “Mist Spray Adhesive”, then the VOC limit for the product shall be the lowest applicable VOC limit specified for “Special Purpose Spray Adhesives.”

### **D. Prohibition on the Use of Toxic Compounds**

Staff proposes a prohibition on the use of toxic compounds: methylene chloride (MeCl), perchloroethylene (Perc), and trichloroethylene (TCE) in aerosol adhesives, effective January 1, 2002. These compounds are used very little in aerosol adhesives and there are alternative formulations available that are formulated without these compounds.

Under the California Toxic Air Contaminant (TAC) Identification and Control Program, the ARB has previously identified MeCl, Perc and TCE as toxic air contaminants. MeCl was identified as a TAC at a Board hearing held in July 1989. The details of staff's evaluation is contained within the ARB staff report, "Staff Report: Proposed Identification of Methylene Chloride as a Toxic Air Contaminant", dated May 1989. In October 1990, the Board identified trichloroethylene as a TAC, and the technical evaluation is contained within the ARB staff report, "Staff Report: Proposed Identification of Trichloroethylene as a Toxic Air Contaminant", dated August 1990. At an October 1991 hearing, Perc was identified as a TAC by the Board. Staff's technical evaluation for Perc is contained within the ARB staff report, "Initial Statement of Reasons for Rulemaking: Proposed Identification of Perchloroethylene as a Toxic Air Contaminant", dated August 1991.

Based on recommendations from the Department of Health Services, in addition to corroboration from the Scientific Review Panel and the Office of Environmental Health Hazard Assessment (OEHHA), the ARB determined that all three compounds are probable human carcinogens, and insufficient data exists to establish minimum threshold levels, below which there would be no adverse health effects.-

Once compounds are identified as TACs by the ARB, Health and Safety Code section 39666(c) requires the ARB to develop air toxic control measures (ATCMs) based on an assessment of the need for and appropriate level of regulation. Staff's assessment on the need to regulate MeCl, Perc and TCE in aerosol adhesives is contained in Appendix G. In regard to toxic air contaminants for which no minimum threshold levels have been identified, the law requires that ATCMs be adopted,

"to reduce emissions to the lowest level achievable through application of best available control technology (BACT) or a more effective control method, unless the State Board or a district Board determines, based on an assessment of risk, that an alternative level of emission reduction is adequate or necessary to prevent an endangerment of public health."

In evaluating the risks from the TACs in aerosol adhesives, staff conducted a risk assessment based on the modeling evaluations used to assess aerosol brake cleaners (ARB report, "Initial Statement of Reasons for Proposed Amendments to the California Regulations for Reducing Volatile Organic Compounds From Consumer Products and Aerosol Coatings Products", October 1996, and the ARB report, "Initial Statement of Reasons for Proposed Airborne Toxic Control Measure for Emissions of Chlorinated Toxic Air Contaminants From Automotive Maintenance and Repair Facilities", March 2000). It should be emphasized that staff's objective was to establish that potential risks exist from the use of aerosol adhesives containing these TACs, as opposed to bracketing the actual risks from their use.

For worker exposure, staff estimated the 8-hour time weighted average for products containing MeCl and Perc. For MeCl, the 8-hour time weighted average was estimated to be 0.97 ppm, and Perc was estimated at 0.26 ppm. The federal OSHA time weighted

exposure limit for MeCl and Perc is 25 ppm and 100 ppm, respectively. As shown, workplace exposure is well below the applicable OSHA standards. An assessment of the only aerosol adhesive product containing TCE revealed that worker exposure to this product is two orders of magnitude lower than the federal OSHA 8-hour time weighted average standard of 100 ppm.

To assess the potential risk to the general population, staff estimated the potential cancer risk of products using MeCl only, and products with MeCl and Perc combined. For MeCl, the potential cancer risk ranged from about 0.2 in a million to 6 in a million, depending on the distance from the source. For the combined product using MeCl and Perc, the combined risk ranged from 3 in a million to 30 in a million, again depending on distance. The highest annual average concentration and risk occurs nearest the source (20 meters), while the lowest exposure and risk occurs farthest from the source (150 meters). Therefore, the actual risk is dependent on receptor location. Staff, in conducting this evaluation, did not evaluate possible receptor locations or population density within the proximity of the source. It should be noted that these estimates would be several factors lower if more typical assumptions were used in the assessment. Also, staff did not assess the potential risk from TCE since the use of TCE in aerosol adhesives is much lower than MeCl and Perc. Considering this, staff estimates that the risk associated with TCE in aerosol adhesives is lower than from products containing both MeCl and Perc.

Although the risks from MeCl, Perc, and TCE in aerosol adhesives are likely to be low, these risks should be taken into account with the exposure and associated risks from other sources of these TACs. Methylene chloride, PERC and TCE are found in numerous consumer and industrial products and processes, when taken in whole, can pose a significant cumulative risk. Therefore, it is necessary to address sources or products individually to reduce the risk from these TACs.

According to the 1998 product survey, only 33 products out of 136 contained either MeCl, Perc, and TCE. The combined sales in 1998 were also found to be a small portion of the overall sales as well. Representatives from NPCA, 3M Products Company, Camie-Campbell and Sprayway Products, support a prohibition on MeCl, Perc, and TCE. The industry representatives indicated that several companies have established internal policies on eliminating the use of MeCl, due to toxicity concerns with their workers. Also, aerosol adhesive consumers have asked for safer products.

As mentioned earlier, there are alternatives to the use of aerosol adhesives formulated with MeCl, Perc and TCE. Some manufacturers have stated that their current products formulated with these TACs can be reformulated without these compounds. Some manufacturers have stated that they would elect to no longer sell these products in California. If these products are no longer available, consumers would have to switch to alternatives that do not use these compounds. Based on our discussions with industry, staff does not anticipate any significant issues with alternative formulations as a replacement to products using these toxic compounds.

Therefore, the staff believes that it would be beneficial to preclude the use of MeCl, Perc, or TCE to reduce the cumulative exposure of these compounds in consumer products to the general population. In addition, the prohibition would only affect a small number of products, and would not eliminate any aerosol adhesive product forms in the marketplace.

### **E. Future Technology Assessment**

Staff intends to conduct a future technology assessment in 2004 to recognize possible development efforts in resins, rubbers, solvents, propellants, and hardware technology that may lead to lower VOC levels. Staff also believes that a future technology assessment would be beneficial to evaluate new exempt solvents that may be added in the future. There are solvents currently being considered by the U.S. EPA for exempt status. These solvents may hold promise in providing manufacturers with better solvent properties and the ability to lower the VOC content in aerosol adhesives. Industry has stated that they would support a future technology assessment.

To aid in the collection of data, staff proposes to amend the dates in section 94513(d) Special Reporting Requirements for Aerosol Adhesives. The reporting date would change from March 31, 1999 to March 31, 2004. The product sales year would change from 1998 to 2003. Lastly, the reference to "the January 1, 2002, VOC limit" would change to "a lower VOC limit."

### **F. Other Amendments**

Staff proposes additional revisions under the definitions section, including separating out the definition of aerosol adhesives from the general definition of "adhesive" and to amend the definition of "aerosol adhesive" within the consumer products regulation to further define "mist", "web", and "special purpose" adhesives. Staff also proposes to amend the definition of "consumer products" to include all uses of aerosol adhesives.

## **VII. ENVIRONMENTAL IMPACTS OF THE PROPOSED AMENDMENTS**

This chapter discusses the environmental impacts of the proposed amendments to the aerosol adhesives standard.

### **A. Overview of Environmental Impact Analysis**

The ARB staff evaluated the environmental impact of the proposed amendments and determined the amendments would allow slightly more emissions than under the existing 25% VOC limit. As discussed in Chapter VI, staff's proposal eliminates the current 25% VOC standard (effective 2002), and replaces it with new VOC standards for three aerosol adhesive categories (mist, web, special purpose). In addition, the proposal precludes the use of certain toxic compounds.

Because the proposed VOC limits are higher than the 25% VOC standard, the proposed amendments are considered a relaxation of the current consumer products regulation. When the 25% VOC standard was adopted in 1992, staff projected a reduction of 0.2 tons per day. This estimate was based on an aerosol adhesive inventory of about 0.4 tons per day, which was derived from the previous 1990 ARB consumer products survey. At that time, the 25% VOC standard was estimated to achieve a 50% emission reduction from aerosol adhesive products.

New information has become available to update the aerosol emissions inventory as well as the technical feasibility of reducing the VOC content in aerosol adhesives. As discussed earlier, staff conducted a 1998 product survey and revised the aerosol emissions inventory to about 1.9 tons per day. The main reason for the large discrepancy is that the 1990 ARB consumer product survey did not include aerosol adhesives used for industrial uses. The 1998 product survey included all uses of aerosol adhesives. Using the revised emission inventory, the proposed amendments would reduce emissions by about 10%, or about 0.2 tons per day in 2002.

The intent of the proposed amendments is to preserve the commercial and technological feasibility of meeting the VOC limits and to ensure that the basic market demand can be met for aerosol adhesives. Without the proposed amendments, many manufacturers would experience adverse economic impacts and a disruption of the aerosol adhesives market could occur. The proposed amendments would help to ensure that manufacturers develop consumer-accepted products to meet the basic demand. The staff believes that these considerations override any adverse impacts that may occur as a result of these amendments.

The staff has also evaluated the environmental impacts of prohibiting the use of methylene chloride, perchloroethylene, and trichloroethylene. Based on the toxicity concerns associated with these compounds, staff expects a positive environmental benefit associated with the proposed amendment to preclude their use. A more detailed discussion is included below.

## **B. Legal Requirements Applicable to Analysis**

The California Environmental Quality Act (CEQA) and ARB policy require an analysis to determine the potential adverse environmental impacts of the proposed standards. Because the ARB's program involving the adoption of regulations has been approved by the Secretary of Resources (see Public Resources Code, section 21080.5), the CEQA environmental analysis requirements are to be included in the ARB's Staff Report in lieu of preparing an environmental impact report or negative declaration. In addition, the ARB will respond in writing to all significant environmental issues raised by the public during the public review period or the public Board hearing. These responses are to be contained within the Final Statement of Reasons for the proposed amendments. Public Resources Code section 21159 requires that the environmental impact analysis conducted by the ARB include the following: 1) an analysis of the reasonably foreseeable environmental impacts of the methods of compliance, 2) an analysis of reasonably foreseeable mitigation measures, and 3) an analysis of reasonably foreseeable alternative means of compliance with the standard. Our analysis of the reasonable foreseeable environmental impacts of the methods of compliance is presented in sections C and E below. With regard to mitigation measures, staff has been unable to identify any reasonably foreseeable mitigation measures that would achieve additional emissions reductions from aerosol adhesives, while at the same time preserving the feasibility of the limits and preventing disruption in the marketplace. Staff's analysis of the feasibility of the limits is contained in Chapter V and VI.

Alternative means of compliance with the aerosol adhesives portion of the consumer products regulation have been studied. One compliance option is available to manufacturers of aerosol adhesive products, the ACP. The ACP is a voluntary market-based regulation that utilizes the concept of an aggregate "bubble". An emissions bubble places an overall limit on the aggregate emissions from a group of products, rather than placing a limit on the VOC content of each individual product. To be approved, an ACP must demonstrate that the total VOC emissions would not exceed the emissions that would have otherwise resulted from products formulated to meet the applicable VOC limits. At this time, the ACP is the only alternative to aerosol adhesive manufacturers that staff has identified.

## **C. Emissions Reductions and Potential Environmental Impacts**

### **1. Impact on Ground Level Ozone**

As discussed, the proposed amendments would result in an adverse environmental impact because they are a relaxation of the existing 25% VOC limit. However, the intent of the proposed amendments is to preserve the commercial and technological feasibility of the VOC limit and to ensure that basic market demand is being met. The ARB staff believes that these considerations override any adverse impacts that may occur as a result of these amendments.

Based on the 1998 product survey, aerosol adhesives emit about 1.9 tons per day VOCs. With a control effectiveness of about 10%, the proposed VOC limits would reduce these emissions by about 0.2 tons per day. If one uses the revised emission inventory from the 1998 product survey, and calculates emission reductions relative to the existing future 25% VOC limit, then the proposed VOC limits would allow about 1 ton per day more emissions. The staff believes that this conservative approach is consistent with the intent of the CEQA requirements, in which full public disclosure on environmental impacts is provided.

## **2. Impact on Particulate Matter (PM10)**

Reducing VOCs has a positive environmental impact by reducing the amount of secondary particulate matter (PM) in the atmosphere. Depending on ambient meteorological conditions and temperature, gas-to-particle conversion of VOCs may occur. One of the chemical mechanisms of gas-to-particle conversion involves the oxidation reactions of VOCs to form semi-volatile or low vapor pressure products that combine with other molecules to form new particles, or which condense on preexisting particles. Therefore, by reducing any VOCs from today's aerosol adhesives, a net benefit would occur as less VOCs are available to form PM10 in the atmosphere.

It is conceivable that the proposed amendments would have an adverse impact on fine particulate matter (PM10), because the proposed VOC limits represent a relaxation of the 25% VOC limit. Therefore, the proposed VOC limits would not reduce as much VOCs, and therefore particulate matter, as originally estimated.

On the other hand, using the baseline inventory from the 1998 product survey and considering the current 75% VOC limit, the proposed amendments would reduce VOCs, and particulate matter, from today's levels.

## **3. Impact on Global Warming**

Staff does not expect the proposed amendments to have an adverse impact on global warming. Global warming is based on the premise that certain emissions absorb infrared radiation in the atmosphere, thereby increasing the overall average global temperature. To meet the VOC limits proposed, manufacturers may likely choose to replace typical hydrocarbon propellants. One possible option for manufacturers, discussed in Appendix F, includes the use of hydrofluorocarbon (HFC) compounds, such as HFC-152a. Because HFC-152a is excluded from the definition of VOC in the consumer products regulation and is negligibly reactive, HFC-152a may be used to a limited extent to reduce the overall VOC content of the aerosol adhesive formulation.

The use of HFC-152a can contribute to global warming, however, even if all aerosol adhesive products contained HFC-152a, the impact to global warming would be negligible. Hydrofluorocarbons are non-chlorinated methane and ethane derivatives, which contain hydrogen and fluorine. Hydrofluorocarbons absorb infrared energy and

therefore can contribute to global warming. Based on the 1998 product survey, about 1.9 tons per day of VOCs are emitted from aerosol adhesives.

To estimate a worst case scenario of global warming impact, staff assumed that all propellant would be replaced with HFC-152a. The HFC-152a compound has 50 times more global warming potential than the hydrocarbon propellants currently used. Estimating that the average aerosol adhesive product under the proposal contains 70 percent VOCs (including solvents and propellants), and that 50% of that amount is propellant, then if all propellant was changed to HFC-152a, the overall increase in HFC emissions would be 0.7 tons per day (i.e. 1.9 tpd x 70% x 50%).

This is a very small increase in HFC-152a emissions, and would have a negligible impact on global warming. In comparison, it is estimated that 100 million tons per day of carbon dioxide, the primary greenhouse gas, is emitted into the atmosphere from existing emission sources.

While this analysis assumes total propellant replacement with HFC-152a, staff believes that this would not be the case, due to other solubility issues and due to the high price of HFC-152a.

#### **4. Impact on Ozone Depletion**

The staff has determined that the proposed amendments would have a minimal impact on 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. The increase in UV radiation leads to greater incidence of skin cancer, cataracts, and impaired immune systems, reduced crop yields and diminished ocean productivity. Because chemical reactions which form tropospheric ozone are driven by UV radiation, it is conceivable that a reduction in stratospheric ozone can also result in an increase in photochemical smog, due to the increased UV radiation.

As discussed above, staff believes that manufacturers could substitute current propellants with limited amounts of HFC-152a. Hydrofluorocarbon-152a is excluded from the list of compounds that are scheduled for phase-out as ozone depleting under the federal Clean Air Act requirements. Therefore, if manufacturers choose to use HFC-152a, then no additional decrease in stratospheric ozone is expected.

#### **5. Impact on Water Quality and Solid Waste Disposal**

Relative to the current formulations of aerosol adhesives, the proposed amendments are not expected to result in any adverse impact to water quality or on solid waste disposal. Consumers are not likely to convert to using water-based brush applied adhesive products, due to the convenience of aerosol adhesives. Because of this, staff does not expect any changes to packaging or disposal of aerosol adhesive products due to the proposed amendments.

#### **D. Health Risk Assessment of Prohibiting the Use of Toxic Compounds in Aerosol Adhesives**

As discussed earlier, the ARB previously identified MeCl, Perc, and TCE as TACs. Furthermore, the Board determined that these TACs are probable human carcinogens and did not establish minimum threshold levels, below which there would be no adverse health effects.

Prohibiting the use of toxic compounds would result in reducing MeCl emissions by 18 TPY, perchloroethylene by 0.4 TPY and trichloroethylene by 0.06 TPY. For a detailed discussion of the health effects of the use of toxic compounds in aerosol adhesives, please see Appendix G. The conclusion of staff's analysis indicates that the overall exposure to MeCl, Perc and TCE is expected to be low for persons using aerosol adhesives containing the toxic compounds and for the public at large.

Staff also recognizes that toxic emissions from aerosol adhesives only represent one source of emissions for public exposure to these compounds. MeCl, Perc, and TCE are also used in numerous other consumer and industrial products (e.g. paints and architectural coatings, brake cleaners, solvent degreasers, etc.). Therefore, staff believes that the public is exposed to cumulative levels of MeCl, Perc, and TCE. The proposed toxics prohibition would reduce the overall cumulative exposure to MeCl, Perc, and TCE.

#### **E. Impacts on the State Implementation Plan**

##### **1. Impacts on the 1994 Ozone SIP and Inventory**

The 1994 State Implementation Plan (SIP) for Ozone is California's master plan for achieving the federal ozone standard in six areas of the state by 2010. The SIP includes state measures to control emissions from motor vehicles and fuels, consumer products and pesticide usage, local measures for stationary and area sources, and federal measures for sources under exclusive or practical federal control. U.S. EPA approved the SIP in September 1996 (62 Federal Register 1150-1201 (January 8, 1997)). Although U.S. EPA has not yet approved subsequent plan revisions for ozone, these plans also rely on measures in the SIP.

As the ARB has implemented the SIP over the last five years, some measures have delivered more reductions than anticipated, while other measures have delivered fewer reductions due to technical or economic concerns. However, once the SIP is approved by the U.S. EPA, the emission inventories and assumptions are frozen. Evaluations of the impacts on the SIP of new measures or modifications to existing measures must use the same emission inventories and assumptions as were used in the 1994 SIP.

## 2. SIP Lawsuit Settlement

In 1997, a lawsuit was filed against South Coast Air Quality Management District, ARB, and U.S. EPA by three Los Angeles based environmental groups for failure to implement specific measures contained in the 1994 SIP (Coalition for Clean Air v. South Coast Air Quality Management District). In January 1999, the Board approved a settlement regarding ARB's portion of the SIP litigation. The lawsuit settlement addresses near-term emission reduction shortfalls of 42 tons per day of ROG and 2 tons per day of NO<sub>x</sub> in the South Coast Air Basin in 2010. ARB must implement programs over the next few years to achieve the specific emission reduction goals outlined in the lawsuit settlement.

## 3. Review of SIP Baseline Measure: Aerosol Adhesives

Because the aerosol adhesive standards were already adopted at the time the 1994 Ozone SIP was developed, emission reductions from those standards were incorporated into the SIP baseline. In the 1994 SIP, a 50 percent reduction in VOC emissions from aerosol adhesives was anticipated by limiting the VOC content of these products to the 25% VOC limit. Table VII-1 contains the forecasted uncontrolled emissions for aerosol adhesives statewide in 2010, and the projected emission reductions due to limiting the VOC content to 25%. As indicated in the table, projected emission reductions in 2010 under the SIP are about 0.28 TPD.

**Table VII-1  
Aerosol Adhesive Control Baseline Measure  
Using 1994 SIP Emissions Inventory  
Statewide in 2010 (in tons of ROG per day)**

1994 SIP Category	Uncontrolled Emissions	1994 SIP Controlled Inventory	Reductions Assumed in 1994 SIP
Aerosol Adhesives	0.56	0.28	0.28

## 4. Impacts of Proposed Amendments

The proposed amendments to the aerosol adhesive standards would relax the 25% VOC limit and would result in less emission reductions. In terms of "1994 SIP currency" the relaxation of the standard and the loss in emission reductions would result in a small SIP shortfall. Also, contributing to the SIP shortfall is the use of acetone, an exempt compound, since the 1994 SIP treats acetone as a VOC and no credit is given in "1994 SIP currency" when acetone is used to reduce VOC emissions.

As shown in Table VII-2, the projected shortfall in "1994 SIP currency" is estimated to be about 0.28 TPD of VOC emission reductions statewide in 2010 from what was assumed in the 1994 SIP. Although using acetone to meet the proposed VOC limits provides real emission reductions, these benefits are not credited in "1994 SIP currency".

**Table VII-2  
Aerosol Adhesive Control with Proposed Amendments  
Using 1994 SIP Emissions Inventory  
Statewide in 2010 (in tons of ROG per day)**

1994 SIP Category	Uncontrolled Emissions	Emission Reduction Assumed in 1994 SIP	Emission Reduction due to Proposal	Emission Reduction Shortfall in "1994 SIP currency"
Aerosol Adhesives	0.56	0.28	0	0.28

As discussed earlier, based on the current inventory, the proposed amendments would achieve about 0.2 TPD of VOC emission reductions, or about a 10% reduction in emissions. If the percent reductions based on the current inventory is applied to the 1994 SIP inventory, the proposed amendments would provide about 0.05 TPD of VOC reductions. Again, because the 1994 SIP gives no credit for acetone, the SIP shortfall remains 0.28 TPD.

### 5. Summary of 1994 SIP Analysis of Proposed Amendments

Relative to the current formulations of aerosol adhesives, the proposed amendments are expected to provide emission reductions statewide toward meeting the State and federal clean air goals. Federal ozone nonattainment areas rely on emission reductions from consumer products, including aerosol adhesives, to meet federal ozone standards between 2005 and 2010, depending on the area. However, using "1994 SIP currency", the staff's proposal would fall short of the 1994 SIP baseline emission reductions target by about 0.28 TPD of VOC emission reductions statewide in 2010. Staff will address this shortfall when the statewide control strategy is revised in 2001. At that time, staff will be assessing all feasible cost-effective emission reductions, including re-examining the standards currently in place for a broad range of consumer products under the jurisdiction of the ARB.



## VIII. ECONOMIC IMPACTS OF THE PROPOSED AMENDMENTS

This chapter discusses the economic impacts that would be expected from the implementation of the proposed amendments to the aerosol adhesives standards, including the proposed prohibition on MeCl, Perc and TCE in aerosol adhesives.

### A. Introduction

Currently, only 7 products comply with the 25% VOC standard. As a result, under the current standard, all remaining products would require reformulation to this standard. Since the proposed VOC limits represent an overall relaxation compared with the current standard, the proposed amendments actually represent a cost-savings relative to the existing standard. This is because more products (26) already comply with the proposed standards, and manufacturers have indicated that reformulation costs to meet the proposed standards would be significantly lower than to meet a 25% VOC standard.

However, even though the proposed amendments would result in a cost savings, staff realizes that manufacturers would need to reformulate many of the products they are currently selling in order to comply with the proposed VOC limits. Therefore, the analysis will focus on the "costs" of meeting the proposed VOC limits (including the proposed ban on toxic compounds) on aerosol adhesive manufacturers, other associated industries, and consumers. Our analysis also estimates the cost-effectiveness of the proposed amendments, and compares this to other consumer product regulations.

Economic impact analyses are inherently imprecise by nature. While staff has quantified the economic impacts to the extent feasible, some assumptions are necessarily qualitative and based on general observations and facts about the aerosol adhesive inventory and industry as a whole. The impacts analysis, therefore, serves to provide a general picture of the economic impacts typical businesses might encounter. Staff recognizes that the impacts on individual companies may vary from those estimated in this chapter.

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

- (C) Economic Impacts Analysis on California Businesses as required by the California Administrative Procedure Act (APA);
- (D) Analysis of Potential Impacts to California State or Local Agencies
- (E) Analysis of the Cost-effectiveness and the Impacts on Per Unit Cost
- (F) Discussion Of The Economic Impacts Of Prohibiting the Use of Toxic Compounds in Aerosol Adhesive Formulations.

## **B. Summary of Findings**

Overall, most manufacturers or marketers of aerosol adhesives products would benefit from the proposed amendments. Staff's analysis shows that most affected businesses would be able to absorb the costs of the proposed amendments with no significant adverse impacts on their profitability. This finding is indicated by the staff's estimated change in "return on owner's equity" (ROE) analysis. The analysis found that the overall change in ROE ranges from negligible to a decline in ROE of less than 4 percent, with an average change in ROE of about 1.5 percent. Because the proposed measures would not alter significantly the profitability of most businesses, we do not expect a noticeable change in employment; business creation, elimination or expansion; and business competitiveness in California. Staff also found no significant adverse fiscal impacts on any local or State agencies.

The cost-effectiveness of the proposed VOC limits is similar to the cost-effectiveness of other ARB consumer product regulatory programs. Our analysis shows that the cost-effectiveness of the proposed amendments is about \$6.00 per pound of VOC reduced.

## **C. Economic Impacts Analysis on California Businesses as Required by the California Administrative Procedures Act (APA)**

### **1. Legal Requirements**

Section 11346.3 of the Government Code requires State agencies to assess the potential for adverse economic impacts on California business enterprises and individuals when proposing to adopt or amend any administrative regulation. The assessment shall include a consideration of the impact of the proposed regulation on California jobs, business expansion, elimination or creation, and the ability of California business to compete with businesses on 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.

### **2. Findings**

Our findings show that most California businesses would be able to absorb the costs of the proposed amendments with no significant adverse impacts on their profitability. However, the proposed amendments may impose economic hardship on some businesses with small or no margin of profitability. These businesses, if necessary, 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. Also, the ACP of the consumer product regulations provides flexibility by allowing emissions averaging between aerosol

adhesive products which may help these businesses to mitigate their costs. Because the proposed amendments would not alter significantly the profitability of most businesses, staff does not expect a noticeable change in employment; business creation, elimination or expansion; and business competitiveness in California.

### **3. Discussion**

This portion of the economic impacts analysis is based on a comparison of the return on owner's equity (ROE) for affected businesses before and after inclusion of the cost to comply with the proposed amendments. The data used in this analysis were obtained from publicly available sources, the ARB's 1998 aerosol adhesives survey, and the staff's cost-effectiveness analysis discussed later in this chapter.

#### **a. Affected Businesses**

Any business which manufactures or markets aerosol adhesive products would potentially be affected by the proposed amendments. Also potentially affected are businesses which supply raw materials and equipment to these manufacturers or marketers, or distribute, sell or use aerosol adhesive products. The focus of this analysis, however, will be on manufacturers or marketers because these businesses would be directly affected by the proposed amendments.

The aerosol adhesive products are manufactured or marketed by 47 companies nationwide, of which seven are based in California according to the ARB's 1998 aerosol adhesive survey. These companies manufacture and market an estimated total of 136 products in California, of which 26 are compliant and 110 are noncompliant products. Of 110 noncompliant products 33 are formulated with toxic compounds. California based companies (mostly medium- or small-sized firms) account for 11 percent of noncompliant products manufactured or marketed in California.

#### **b. Study Approach**

The approach used in evaluating the potential economic impact of the proposed amendments on these businesses is outlined as follows:

- (1) A sample of three representative businesses of different sizes were selected from the list of 47 affected businesses based on the size of their sales and number of noncompliant products they manufacture or market.
- (2) Compliance cost was estimated for each of these businesses.
- (3) Estimated cost was adjusted for federal and state taxes.
- (4) The three-year average ROE was calculated, where data were available, for each of these businesses by averaging their ROEs for 1996 through 1998. ROE is calculated by dividing the net profit by the net worth. The adjusted cost was then subtracted from net profit data. The results were used to calculate an adjusted three-year average ROE. The adjusted ROE was then compared with the ROE before the subtraction of the

adjusted cost to determine the potential impact on the profitability of the 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, 1998). This threshold is consistent with the thresholds used by the United States Environmental Protection Agency and others.

### **c. Assumptions**

The ROEs before and after the subtraction of the adjusted compliance costs were calculated for each size business using financial data for 1996 through 1998. The calculations were based on the following assumptions:

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

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

## **4. Results**

Typical California businesses are affected by the proposed VOC limits to the extent that the implementation of these requirements would change their profitability. Using ROE to measure profitability, staff found that of the seven California manufacturers making noncomplying aerosol coatings, the change in ROE varied from a negligible affect to a drop of about 4 percent, with most companies experiencing a drop of 1.4 percent or less. This represents a minor change in the average profitability of a California business.

The estimated potential impacts to businesses' ROEs may be high because affected businesses probably would not absorb all of the increase in their costs of doing business. They might be able to pass some of the cost on to consumers in the form of higher prices, reduce their costs, or do both.

### **a. Potential Impact on the Consumer**

The potential impact of the proposed amendments on the consumer 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, staff does 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 could pass their cost increases on to consumers. In such a case, staff estimates that price increases would be about 8 percent, as calculated later in this chapter, which represents a minor impact on consumers.

The proposed amendments 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 most categories, there are complying products already available on the market. Thus, industry already has the technology to manufacture compliant products that meet consumer expectations. Second, marketers are unlikely to introduce a product which does not meet consumer 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 equity"). Finally, the Board has provided, under its existing consumer products program, flexibility to businesses whose situations warrant an extension to their compliance dates. For companies which 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.

### **b. Potential Impact on Employment**

The proposed amendments are not expected to cause a noticeable change in California employment and payroll because the contribution of the affected industry to the California economy is marginal. California accounts for a small share of manufacturing employment for aerosol adhesive products. According to the 1997 Economic Census, California employment in businesses classified as Standard Industrial Code 2891 and North American Industry Classification System 325520, which includes aerosol adhesive industry, was 1,728 in 1997, or about 8 percent of the national employment in the industry. This also represents only about 0.09 percent of the total manufacturing jobs in California. These employees working in 70 establishments generated about \$71 million in payroll, accounting for less than 0.1 percent of total California manufacturing payroll in 1997.

### **c. Potential Impact on Business Creation, Elimination or Expansion**

The proposed amendments 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 in a timely manner. Should the proposed amendments impose significant hardship on these businesses, temporary relief in the form of a compliance date extension under the variance provision may be warranted.

While some individual businesses may be impacted, the proposed amendments may provide business opportunities for other 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.

#### **d. Potential Impact on Business Competitiveness**

The proposed amendments would have no significant impact on the ability of California's businesses to compete with businesses in other states. Because the proposed amendments would apply to all businesses that manufacture or market aerosol adhesives regardless of their location, the proposed amendments should not present any economic disadvantages specific to California businesses.

#### **D. Analysis of Potential Impacts to California State or Local Agencies**

Staff has determined that the proposed amendments would 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.

#### **E. Analysis of the Cost-Effectiveness and the Impacts on Per Unit Cost**

As stated earlier, currently only 7 products comply with the January 1, 2002, 25% VOC standard. As a result, under the current standard, all remaining products would require reformulation to meet this standard. Since the proposed VOC limits represent an overall relaxation compared with the current standard, the proposed amendments represent a cost-savings relative to the existing standard. This is because more products (26) already comply with the proposed standards, and manufacturers have indicated that reformulation costs to meet the proposed standards would be significantly lower than to meet a 25% VOC standard.

However, since many manufacturers would still have to reformulate their products to meet the proposed VOC limits, in the following analysis staff has evaluated the anticipated cost-effectiveness of the proposed amendments. Such an evaluation allows the staff to estimate the efficiency of the regulation in reducing a pound of VOC relative to the efficiencies of other existing regulatory programs. To do this, staff applied a well-established methodology for converting compliance costs to an annual basis. Staff 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."

## 1. Methodology

The cost-effectiveness of a limit is generally defined as the ratio of total dollars to be spent to comply with the limit (as an annual cost) to the mass reduction of the pollutant achieved by the limit (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, development of new labels, etc.) and annualized recurring costs (e.g., raw materials, separate California inventory, etc.).

Staff annualized the nonrecurring fixed costs using the Capital Recovery Method as recommended under guidelines issued by the California Environmental Protection Agency (Cal/EPA). Using this method, staff multiplied the estimated total fixed costs to comply with each limit 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). Staff then summed the annualized fixed costs with the annual recurring costs and divide by the annual VOC emission reductions to calculate the cost-effectiveness of each limit, as shown by the following general equation:

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

Where:

$$\begin{aligned} \text{Annual Recurring Costs} &= \text{Total Recurring Cost (Recurring Cost per Product) x} \\ &\quad \text{(Total Non-compliant Products)} \\ \text{Annualized Fixed Costs} &= (\text{Fixed Costs}) \times (\text{Capital Recovery Factor}) \end{aligned}$$

Where:

$$\begin{aligned} \text{Fixed Costs} &= \text{Total Nonrecurring Cost (Nonrecurring Cost per} \\ &\quad \text{Product) x (Total Non-compliant Products)} \\ \text{Capital Recovery Factor} &= 0.24716 \text{ (7.5\% interest over 5 years)} \end{aligned}$$

## 2. Assumptions

Staff calculated the cost-effectiveness with an assumed project horizon of five years. Staff also assumed a fixed interest rate of 7.5 percent throughout the project horizon. Based on these assumptions, the Capital Recovery Factor is 0.24716. These assumptions are more conservative than those used in other cost-effectiveness analyses of air pollution regulations. For example, in calculating the cost-effectiveness of the Mid-term Measures consumer products regulation, a 10 year project horizon and 10 percent interest rate were used, yielding a CRF of 0.16274.

In calculating the annual recurring costs, staff identified two separate costs that would occur each year. First, based on discussions with industry, some manufacturers have indicated that their reformulated products would not be marketed nationally, but rather would be sold only in California. This is because they believe that the reformulated products would not be cost or performance competitive with the rest of the nation. Therefore, staff expects that manufacturers would incur additional costs for separate raw material and finished product inventory, as well as additional storage costs. Based on these discussions with manufacturers, staff has estimated these costs to be about \$5000 per reformulated product, which calculates to approximately \$1,100 per day for the proposed standards.

In addition, staff has identified annual raw material costs associated with reformulating non-complying products with acetone. To do this, staff first determined the amount of each VOC used in aerosol adhesives (excluding propellants, since staff does not expect that VOC propellant usage would change with product reformulation) based on the 1998 Survey. It was also assumed that the solid content of each non-complying product would remain unchanged. Then, staff determined the sales weighted average (SWA) VOC price based on market prices available in the *Chemical Market Report* for the week ending November 26, 1999. Based on this data, the SWA VOC price was approximately \$0.18 per pound, and the price of acetone was \$0.14 per pound.

Staff then determined, for each non-complying VOC product, the cost differential of substituting VOC material with acetone. This substitution resulted in a cost-savings of approximately \$0.11 per pound of VOC replaced. For products containing toxic compounds (either methylene chloride or PERC), staff assumed that the market share of the product would be replaced with a product formulated to the category limit. In these cases, VOC replacement of the toxic compounds also resulted in a cost-savings as the price of methylene chloride is \$0.45 per pound, and PERC costs \$0.32 per pound. The analysis showed that per non-complying product, the average cost-savings was approximately \$45 per day. Therefore, the overall recurring annual costs for the proposed amendments is about \$1050 per day.

In calculating the fixed costs, staff based our assumptions on information provided by manufacturers as to the costs associated with product reformulation. Manufacturers indicated that fixed reformulation costs would include cost associated with research and development (including labor, materials, product and consumer testing, and new equipment), new labels and new product literature. Manufacturers indicated that these costs could range from \$10,000 to \$200,000 per product reformulation. However, staff believes that a typical reformulation cost would be about \$25,000 per product. This is well within the range of most cost estimates staff received from manufacturers. Staff believes that the high end of these cost estimates is not realistic because the proposed limits are not technology forcing and would not require new resin or product technology, and is not consistent with the need for most products to achieve an average 6% reduction in VOC content. Based on this reformulation cost per product, staff has estimated that overall fixed reformulation costs would total approximately \$2,000,000, with an annualized daily fixed cost of about \$1,350.

In determining the fixed costs associated with the proposed amendments, staff identified several non-complying products that were not considered in the above analysis. These products were excluded from our analysis for one of three reasons. Either the product was identical to another product within the category (ex., the same formulator labeled the same product formulation under different private labels), the product contained toxic compounds and the formulator had a VOC containing product with a similar use within the category, or the product contained toxic compounds and the product sales were less than 100 pounds per year. In using the last set of criteria to exclude products, staff believes that at such a low sales level, sales of the product would not justify the reformulation investment and the formulator would likely discontinue the sale of the product in California.

It is important to note, that in the analysis, staff assumed that all manufacturers would conduct their own research and development, purchase their own equipment, and make all other expenditures and efforts necessary to reformulate their products. Essentially, each manufacturer and marketer is assumed to directly conduct all reformulation and research and development efforts.

### 3. Results

The cost-effectiveness of the proposed VOC limits is presented in Table VIII-1. As shown in the table, cost-effectiveness is \$6.02 per pound of VOC reduced. This value is within the range of cost-effectiveness of other amendments to the consumer products regulation. For perspective, the cost-effectiveness of the Mid-Term Measures and Mid-Term Measures II Regulations varied from no cost to about \$7.10 and \$6.30 respectively, per pound of VOC reduced.

**TABLE VIII-1  
ESTIMATED COST EFFECTIVENESS**

California Sales (TPD)	VOC Reductions (TPD)	Annualized Fixed Cost (\$/day)	Annualized Recurring Cost (\$/day)	Total Annual Cost (\$/day)	Cost-Effectiveness (\$/lb-VOC reduced)
2.85	0.2	1,354	1,052	2,406	6.02

Staff has also determined the per-unit price increase of the proposed amendments. To calculate these costs, staff first calculated the SWA average can size based on sales by container size in the 1998 survey. Based on this data, the average can size was 11.25 ounces, which based on about 2 million pounds of aerosol adhesives sold statewide annually, results in about 3 million units sold. Considering the total annual cost of the proposed amendments is less than \$900,000 per year, the average price increase is about 30 cents per can. Assuming the cost increases between manufacturer, distributor

and retailer, staff estimates a maximum per unit cost increase of about 60 cents per unit.

Staff also conducted a shelf survey to collect retail product price data. Based on this data, staff determined the SWA price was about \$8.00 per can. Therefore, the overall price increase associated with the proposed amendments represents less than an eight percent increase in per unit cost to the consumer.

#### **F. Discussion of the Economic Impact of Prohibiting the Use of MeCl, Perc and TCE in Aerosol Adhesive Formulations**

Currently, 33 aerosol adhesive products are formulated with toxic compounds (MeCl, Perc or TCE). However, 26 of these products do not meet the January 1, 2002, 25% VOC standard, meaning they would have to be reformulated anyway under the current standard. Therefore, to the extent that staff believes compliance with the proposed amendments provides an overall lower cost of compliance than with the 25% VOC standard, the economic impacts on these products and product formulators should be lower than from the current standard, and the costs to these product formulators should be consistent with those costs calculated above.

However, there are currently 7 products formulated with MeCl which comply with the 25% VOC standard. Under the proposed amendments to ban the use of toxic compounds in aerosol adhesives, these products would no longer comply with the proposed standards and would require reformulation. Therefore, the formulators of these products would incur costs that they would not incur under the current standard. Of these 7 products, staff believes that only 5 are candidates for reformulation based on sales data. Therefore, these product formulators would likely incur the reformulation costs identified above (the reformulation costs for these products was included in the cost-effectiveness analysis in section E), or would elect to not market these products in California and their only costs would be lost sales. Assuming none of these 7 products are reformulated, and using the average per unit cost calculated above, with sales of about 6,200 units of these products, with a conservative net profit of 15% per unit, staff believes lost sales of these products would amount to about \$7,500 per year.

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- APPENDIX A: Proposed Consumer Products Regulation Order**
- APPENDIX B: Criteria for Determining Commercially and Technologically Feasible**
- APPENDIX C: Meeting Notices**
- APPENDIX D: 1998 Aerosol Adhesives Survey**
- APPENDIX E: Survey Results**
- APPENDIX F: 1999 Technical Assessment of Aerosol Adhesives**
- APPENDIX G: Health Risk and Needs Assessment of Methylene Chloride, Perchloroethylene and Trichloroethylene**



**APPENDIX A: PROPOSED CONSUMER PRODUCTS REGULATION ORDER**



**Proposed Regulation Order  
REGULATION FOR REDUCING  
VOLATILE ORGANIC COMPOUND  
EMISSIONS FROM CONSUMER PRODUCTS**

[Note: The proposed amendments to Sections 94508, 94509, 94512, and 94513, Title 17, California Code of Regulations (CCR), for this rulemaking action are shown in ~~bold strike-out~~ to indicate proposed deletions and double-underline to indicate proposed additions.

In the interests of clarity and completeness, the regulation text below also shows recent amendments that have been proposed or approved by the Board as part of the "Mid-term Measures II" rulemaking action, which was considered by the Board at an October 29, 1999 public hearing. These recent amendments have not yet been submitted to the Office of Administrative Law and are not yet legally effective. The "Mid-term Measures II" amendments are identified by underline for proposed additions and ~~strikeout~~ for proposed deletions.

*Amend section 94508, title 17, CCR, to read as follows:*

**94508. Definitions**

- (a) For the purpose of this article, the following definitions apply:
- (1) "Adhesive" means any product that is used to bond one surface to another by attachment. "Adhesive" does not include products used on humans and animals, adhesive tape, contact paper, wallpaper, shelf liners, or any other product with an adhesive incorporated onto or in an inert substrate. For "Contact Adhesive," "Construction, and Panel, and Floor Covering Adhesive," and "General Purpose Adhesive" only, "adhesive" also does not include units of product, less packaging, which weigh more than one pound ~~or~~ and consist of more than 16 fluid ounces. This limitation does not apply to aerosol adhesives. ~~For the purpose of this article, "Aerosol Adhesive" means an aerosol product in which the spray mechanism is permanently housed in a nonrefillable can designed for hand held application without the need for ancillary hoses or spray equipment.~~
- (2) "Adhesive Remover" means a product designed exclusively for the removal of adhesives, caulk and other bonding materials from either a specific substrate or a variety of substrates.
- (3) "Aerosol Adhesive" means any adhesive packaged as an aerosol product in

which the spray mechanism is permanently housed in a nonrefillable can designed for hand-held application without the need for ancillary hoses or spray equipment. Aerosol adhesives include special purpose spray adhesives, mist spray adhesives, and web spray adhesives.

- (43) "Aerosol Cooking Spray" means any aerosol product designed either to reduce sticking on cooking and baking surfaces or to be applied on food, or both.
- (54) "Aerosol Product" means a pressurized spray system that dispenses product ingredients by means of a propellant or mechanically induced force. "Aerosol Product" does not include pump sprays.
- (65) "Agricultural Use" means the use of any pesticide or method or device for the control of pests in connection with the commercial production, storage or processing of any animal or plant crop. "Agricultural Use" does not include the sale or use of pesticides in properly labeled packages or containers which are intended for: (A) Home use, (B) Use in structural pest control, or (C) Industrial or Institutional use. For the purposes of this definition only:
- "Home use" means use in a household or its immediate environment.
- "Structural pest control" means a use requiring a license under Chapter 14 (commencing with Section 8500), Division 3, of the Business and Professions Code.
- "Industrial use" means use for or in a manufacturing, mining, or chemical process or use in the operation of factories, processing plants, and similar sites.
- "Institutional use" means use within the lines of, or on property necessary for the operation of buildings such as hospitals, schools, libraries, auditoriums, and office complexes.
- (76) "Air Freshener" means any consumer product including, but not limited to, sprays, wicks, powders, and crystals, designed for the purpose of masking odors, or freshening, cleaning, scenting, or deodorizing the air. "Air Freshener" includes dual purpose air freshener/disinfectant products. "Air Freshener" does not include products that are used on the human body, or products that function primarily as cleaning products as indicated on a product label or advertisement.
- (87) "All Other Carbon-Containing Compounds" means all other compounds which contain at least one carbon atom and are not a "Table B" or a "LVP-VOC."

- (98)** "All Other Forms" means all consumer product forms for which no form-specific VOC standard is specified. Unless specified otherwise by the applicable VOC standard, "all other forms" include, but are not limited to, solids, liquids, wicks, powders, crystals, and cloth or paper wipes (towelettes).
- (109)** "Antimicrobial Hand or Body Cleaner or Soap" means a cleaner or soap which is designed to reduce the level of microorganisms on the skin through germicidal activity, and is regulated as an over-the-counter drug by the U.S. Food and Drug Administration. "Antimicrobial Hand or Body Cleaner or Soap" includes, but is not limited to, (A) antimicrobial hand or body washes/cleaners, (B) foodhandler hand washes, (C) healthcare personnel hand washes, (D) pre-operative skin preparations and (E) surgical scrubs. "Antimicrobial Hand or Body Cleaner or Soap" does not include prescription drug products, antiperspirants, "Astringent/Toner," deodorant, "Facial Cleaner or Soap," "General-use Hand or Body Cleaner or Soap," "Hand Dishwashing Detergent" (including antimicrobial), "Heavy-duty Hand Cleaner or Soap," "Medicated Astringent/Medicated Toner," and "Rubbing Alcohol."
- (1140)** "Architectural Coating" means a coating applied to stationary structures and their appurtenances, to mobile homes, to pavements, or to curbs.
- (1244)** "ASTM" means the American Society for Testing and Materials.
- (1342)** "Astringent/Toner" means any product not regulated as a drug by the United States Food and Drug Administration (FDA) which is applied to the skin for the purpose of cleaning or tightening pores. This category also includes clarifiers and substrate-impregnated products. This category does not include any hand, face, or body cleaner or soap product, "Medicated Astringent/Medicated Toner", "Personal Fragrance Product", cold cream, lotion, or antiperspirant.
- (1413)** "Automotive Brake Cleaner" means a cleaning product designed to remove oil, grease, brake fluid, brake pad material or dirt from motor vehicle brake mechanisms.
- (1544)** "Automotive Hard Paste Wax" means an automotive wax or polish which is: (A) designed to protect and improve the appearance of automotive paint surfaces; and (B) a solid at room temperature; and (C) contains 0% water by formulation.
- (1645)** "Automotive Instant Detailer" means a product designed for use in a pump spray that is applied to the painted surface of automobiles and wiped off prior to the product being allowed to dry.

- (1716)** “Automotive Rubbing or Polishing Compound” means a product designed primarily to remove oxidation, old paint, scratches or “swirl marks”, and other defects from the painted surfaces of motor vehicles without leaving a protective barrier.
- (1817)** “Automotive Wax, Polish, Sealant or Glaze” means a product designed to seal out moisture, increase gloss, or otherwise enhance a motor vehicle’s painted surfaces. “Automotive Wax, Polish, Sealant or Glaze” includes, but is not limited to, products designed for use in autobody repair shops and “drive-through” car washes, as well as products designed for the general public. “Automotive Wax, Polish, Sealant or Glaze” does not include “Automotive Rubbing or Polishing Compounds”, automotive wash and wax products, surfactant-containing car wash products, and products designed for use on unpainted surfaces such as bare metal, chrome, glass, or plastic.
- (1918)** “Automotive Windshield Washer Fluid (Dilutable)” means any liquid sold in a 1 quart container or less, and which meets the following criteria:
- (A) the product is sold either in a container with a capacity of 55 gallons or more, or a container with a capacity of one quart or less; and
  - (B) the product is designed for use in a motor vehicle windshield washer fluid system as an anti-freeze or for the purpose of cleaning, washing, bug removal, or wetting the windshield(s).
- “Automotive Windshield Washer Fluid (Dilutable)” does not include any fluid which is placed in a new motor vehicle at the time the vehicle is manufactured.
- (20 19)** “Automotive Windshield Washer Fluid (Pre-Mixed)” means any liquid sold in a container greater than 1 quart in volume which meets the following criteria:
- (A) the product is sold in a container with a capacity that is greater than one quart, but less than 55 gallons; and
  - (B) the product is designed for use in a motor vehicle windshield washer fluid system as an anti-freeze or for the purpose of cleaning, washing, bug removal, or wetting the windshield(s).
- “Automotive Windshield Washer Fluid (Pre-Mixed)” does not include any fluid which is placed in a new motor vehicle at the time the vehicle is manufactured.
- (2120)** “Bathroom and Tile Cleaner” means a product designed to clean tile or surfaces in bathrooms. “Bathroom and Tile Cleaner” does not include products specifically designed to clean toilet bowls or toilet tanks.
- (2224)** “Bug and Tar Remover” means a product designed to remove either or both of the following from painted motor vehicle surfaces without causing damage to the finish: (A) biological-type residues such as insect carcasses and tree sap and, (B) road grime, such as road tar, roadway paint markings, and

asphalt.

- (2322)** "California Sales" means the sales (net pounds of product, less packaging and container, per year) in California for either the calendar year immediately prior to the year that the registration is due or, if that data is not available, any consecutive 12 month period commencing no earlier than 2 years prior to the due date of the registration. If direct sales data for California is not available, sales may be estimated by prorating national or regional sales data by population.
- (2423)** "~~Carburetor-C choke-Cleaner~~ or Fuel-Injection Air Intake Cleaners" means a product designed to remove fuel deposits, dirt, or other contaminants from a carburetor, choke, throttle body of a fuel-injection system, or associated linkages. "~~Carburetor -Choke-Cleaner~~ or fuel-injection air intake cleaners" does not include products designed exclusively to be introduced directly into the fuel lines or fuel storage tank prior to introduction into the carburetor or fuel injectors.
- (2524)** "Carpet and Upholstery Cleaner" means a cleaning product designed for the purpose of eliminating dirt and stains on rugs, carpeting, and the interior of motor vehicles and/or on household furniture or objects upholstered or covered with fabrics such as wool, cotton, nylon or other synthetic fabrics. "Carpet and Upholstery Cleaner" includes, but is not limited to, products that make fabric protectant claims. "Carpet and Upholstery Cleaner" does not include "General Purpose Cleaners", "Spot Removers", vinyl or leather cleaners, dry cleaning fluids, or products designed exclusively for use at industrial facilities engaged in furniture or carpet manufacturing.
- (2625)** "Charcoal Lighter Material" means any combustible material designed to be applied on, incorporated in, added to, or used with charcoal to enhance ignition. "Charcoal Lighter Material" does not include any of the following: (A) electrical starters and probes, (B) metallic cylinders using paper tinder, (C) natural gas, (D) propane, and (E) fat wood.
- (2726)** "Colorant" means any pigment or coloring material used in a consumer product for an aesthetic effect, or to dramatize an ingredient.
- (2827)** "~~Construction, and Panel, and Floor Covering Adhesive~~" means any one-component adhesive ~~having gap-filling capabilities; and which distributes stress uniformly throughout the bonded area, resulting in a reduction or elimination of mechanical fasteners.~~ that is designed exclusively 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".

- (2928)** "Consumer" means any person who seeks, purchases, or acquires any consumer product for personal, family, household, or institutional use. Persons acquiring a consumer product for resale are not "consumers" for that product.
- (3029)** "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. As used in this article, the term "consumer product" shall also refer to aerosol adhesives, including aerosol adhesives used for consumer, industrial, and commercial uses.
- (3130)** "Contact Adhesive" means an adhesive that: (A) is designed for application to both surfaces to be bonded together, and (B) is allowed to dry before the two surfaces are placed in contact with each other, and (C) forms an immediate bond that is impossible, or difficult, to reposition after both adhesive-coated surfaces are placed in contact with each other, and (D) does not need sustained pressure or clamping of surfaces after the adhesive-coated surfaces have been brought together using sufficient momentary pressure to establish full contact between both surfaces. "Contact Adhesive" does not include rubber cements that are primarily intended for use on paper substrates.
- (3234)** "Container/Packaging" means the part or parts of the consumer or institutional product which serve only to contain, enclose, incorporate, deliver, dispense, wrap or store the chemically formulated substance or mixture of substances which is solely responsible for accomplishing the purposes for which the product was designed or intended. "Container/Packaging" includes any article onto or into which the principal display panel and other accompanying literature or graphics are incorporated, etched, printed or attached.
- (3332)** "Crawling Bug Insecticide" means any insecticide product that is designed for use against ants, cockroaches, or other household crawling arthropods,

including, but not limited to, mites, silverfish or spiders. "Crawling Bug Insecticide" does not include products designed to be used exclusively on humans or animals, or any house dust mite product. For the purposes of this definition only:

"House dust mite product" means a product whose label, packaging, or accompanying literature states that the product is suitable for use against house dust mites, but does not indicate that the product is suitable for use against ants, cockroaches, or other household crawling arthropods.

"House dust mite" means mites which feed primarily on skin cells shed in the home by humans and pets and which belong to the phylum Arthropoda, the subphylum Chelicerata, the class Arachnida, the subclass Acari, the order Astigmata, and the family Pyroglyphidae.

- (3433) "Device" means any instrument or contrivance (other than a firearm) which is designed for trapping, destroying, repelling, or mitigating any pest or any other form of plant or animal life (other than man and other than bacteria, virus, or other microorganism on or in living man or other living animals); but not including equipment used for the application of pesticides when sold separately therefrom.
- (3534) "Disinfectant" means 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 designed solely for use on human or animals, (B) products designed for agricultural use, (C) products designed solely for use in swimming pools, therapeutic tubs, or hot tubs, (D) products which, as indicated on the principal display panel or label, are designed primarily for use as bathroom and tile cleaners, glass cleaners, general purpose cleaners, toilet bowl cleaners, or metal polishes.
- (3635) "Distributor" means any person to whom a consumer product is sold or supplied for the purposes of resale or distribution in commerce, except that manufacturers, retailers, and consumers are not distributors.
- (3736) "Double Phase Aerosol Air Freshener" means an aerosol air freshener with the liquid contents in two or more distinct phases that requires the product container be shaken before use to mix the phases, producing an emulsion.
- (3837) "Dry Cleaning Fluid" means any non-aqueous liquid product designed and labeled exclusively for use on: (1) fabrics which are labeled "for dry clean only", such as clothing or drapery; or (2) "S-coded" fabrics. "Dry Cleaning

Fluid” includes, but is not limited to, those products used by commercial dry cleaners and commercial businesses that clean fabrics such as draperies at the customer s residence or work place. “Dry Cleaning Fluid” does not include “Spot Remover” or “Carpet and Upholstery Cleaner”. For the purposes of this definition, S-coded fabric means an upholstery fabric designed to be cleaned only with water-free spot cleaning products as specified by the Joint Industry Fabric Standards Committee.”

- (3938)** “Dual Purpose Air Freshener/Disinfectant” means an aerosol product that is represented on the product container for use as both a disinfectant and an air freshener, or is so represented on any sticker, label, packaging, or literature attached to the product container.
- (4039)** “Dusting Aid” means a product designed to assist in removing dust and other soils from floors and other surfaces without leaving a wax or silicone based coating. “Dusting Aid” does not include products which consist entirely of compressed gases for use in electronic or other specialty areas.
- (4140)** “Electronic Cleaner” means a product designed specifically for the removal of dirt, grease or grime from electrical equipment such as electric motors, circuit boards, electricity panels, and generators.
- (4241)** “Engine Degreaser” means a cleaning product designed to remove grease, grime, oil and other contaminants from the external surfaces of engines and other mechanical parts.
- (4342)** “Executive Officer” means the Executive Officer of the Air Resources Board, or his or her delegate.
- (4443)** “Existing Product” means any formulation of the same product category and form sold, supplied, manufactured, or offered for sale in California prior to the following dates, or any subsequently introduced identical formulation:
- (A) ~~October 21, 1991, for all products listed in section 94509(a) that have initial effective dates of January 1, 1993, or January 1, 1994; subject to the Phase I VOC standards specified in section 94509(a);~~
  - (B) ~~January 6, 1993, for all products listed in section 94509(a) that have initial effective dates of January 1, 1995, or January 1, 1997, and charcoal lighter materials subject to section 94509(h); subject to the Phase II VOC standards specified in section 94509(a);~~
  - (C) ~~the operative date of the Phase III VOC standards (i.e., 30 days after the Phase III rulemaking action is approved by the Office of Administrative Law), for products subject to the Phase III VOC standards specified in~~

section 94509(a), August 18, 1998, for all products listed in section 94509(a) that have initial effective dates of January 1, 2001, January 1, 2002, January 1, 2003, or January 1, 2005;

- (D) the operative date of the "Mid-term Measures II" amendments (i.e. 30 days after the "Mid-term Measures II" rulemaking action is approved by the Office of Administrative Law), for all products in the following product categories listed in section 94509(a): "Non-aerosol General Purpose Degreaser," "Sealant and Caulking Compound," and "Tire Sealant and Inflator."
- (4544) "Fabric Protectant" means 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 water liquid into the fabric's fibers. "Fabric Protectant" does not include ~~silicone-based products whose function is to provide water repellency, 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.
- (4645) "Facial Cleaner or Soap" means a cleaner or soap designed primarily to clean the face. "Facial Cleaner or Soap" includes, but is not limited to, facial cleansing creams, gels, liquids, lotions, and substrate-impregnated forms. "Facial Cleaner or Soap" does not include prescription drug products, "Antimicrobial Hand or Body Cleaner or Soap," "Astringent/Toner," "General-use Hand or Body Cleaner or Soap," "Medicated Astringent/Medicated Toner," or "Rubbing Alcohol."
- (4746) "Fat Wood" means pieces of wood kindling with high naturally-occurring levels of sap or resin which enhance ignition of the kindling. "Fat wood" does not include any kindling with substances added to enhance flammability, such as wax-covered or wax-impregnated wood-based products.
- (4847) "Flea and Tick Insecticide" means any insecticide product that is designed for use against fleas, ticks, their larvae, or their eggs. "Flea and Tick Insecticide" does not include products that are designed to be used exclusively on humans or animals and their bedding.
- (4948) "Flexible Flooring Material" means asphalt, cork, linoleum, no-wax, rubber, seamless vinyl and vinyl composite flooring.
- (5049) "Floor Polish or Wax" means a wax, polish, or any other product designed to polish, protect, or enhance floor surfaces by leaving a protective coating that is designed to be periodically replenished. "Floor Polish or Wax" does not include "spray buff products", products designed solely for the purpose of cleaning floors, floor finish strippers, products designed for unfinished wood

floors, and coatings subject to architectural coatings regulations.

- (5150)** “Floor Seam Sealer” means any product designed and labeled exclusively for bonding, fusing, or sealing (coating) seams between adjoining rolls of installed flexible sheet flooring.
- (5254)** “Floor Wax Stripper” means a product designed to remove natural or synthetic floor polishes or waxes through breakdown of the polish or wax polymers, or by dissolving or emulsifying the polish or wax. “Floor Wax Stripper” does not include aerosol floor wax strippers or products designed to remove floor wax solely through abrasion.
- (5352)** “Flying Bug Insecticide” means any insecticide product that is designed for use against flying insects or other flying arthropods, including but not limited to flies, mosquitoes, moths, or gnats. “Flying Bug Insecticide” does not include “wasp and hornet insecticide”, products that are designed to be used exclusively on humans or animals, or any moth-proofing product. For the purposes of this definition only, “moth-proofing product” means a product whose label, packaging, or accompanying literature indicates that the product is designed to protect fabrics from damage by moths, but does not indicate that the product is suitable for use against flying insects or other flying arthropods.
- (5453)** “Fragrance” means a substance or complex mixture of aroma chemicals, natural essential oils, and other functional components with a combined vapor pressure not in excess of 2 mm of Hg at 20°C, the sole purpose of which is to impart an odor or scent, or to counteract a malodor.
- (5554)** “Furniture Maintenance Product” means a wax, polish, conditioner, or any other product designed for the purpose of polishing, protecting or enhancing finished wood surfaces other than floors. “Furniture Maintenance Product” does not include dusting aids, products designed solely for the purpose of cleaning, and products designed to leave a permanent finish such as stains, sanding sealers and lacquers.
- (5655)** “Furniture Coating” means any paint designed for application to room furnishings including, but not limited to, cabinets (kitchen, bath and vanity), tables, chairs, beds, and sofas.
- (5756)** “Gel” means a colloid in which the disperse phase has combined with the continuous phase to produce a semisolid material, such as jelly.
- (5857)** “General Purpose Adhesive” means any non-aerosol adhesive designed for use on a variety of substrates. “General Purpose Adhesive” does not include (A) contact adhesives, (B) construction, and panel, and floor covering

adhesives, (C) adhesives designed exclusively for application on one specific category of substrates (i.e., substrates that are composed of similar materials, such as different types of metals, paper products, ceramics, plastics, rubbers, or vinyls), or (D) adhesives designed exclusively for use on one specific category of articles (i.e., articles that may be composed of different materials but perform a specific function, such as gaskets, automotive trim, weather-stripping, or carpets).

- (5958)** "General Purpose Cleaner" means a product designed for general all-purpose cleaning, in contrast to cleaning products designed to clean specific substrates in certain situations. "General Purpose Cleaner" includes products designed for general floor cleaning, kitchen or countertop cleaning, and cleaners designed to be used on a variety of hard surfaces.
- (6059)** "General Purpose Degreaser" means any product designed to remove or dissolve grease, grime, oil and other oil-based contaminants from a variety of substrates, including automotive or miscellaneous metallic parts. "General Purpose Degreaser" does not include "Engine Degreaser", "General Purpose Cleaner", "~~Metallic Parts Cleaner~~", "Adhesive Remover", "Electronic Cleaner", or "Metal Polish/Cleanser", 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". "Solvent cleaning tanks or related equipment" includes, but is not limited to, cold cleaners, vapor degreasers, conveyorized degreasers, film cleaning machines, or products designed to clean miscellaneous metallic parts by immersion in a container.
- (6160)** "General-use Hand or Body Cleaner or Soap" means a cleaner or soap designed to be used routinely on the skin to clean or remove typical or common dirt and soils. "General-use Hand or Body Cleaner or Soap" includes, but is not limited to, hand or body washes, dual-purpose shampoo-body cleaners, shower or bath gels, and moisturizing cleaners or soaps. "General-use Hand or Body Cleaner or Soap" does not include prescription drug products, "Antimicrobial Hand or Body Cleaner or Soap", "Astringent/Toner", "Facial Cleaner or Soap", "Hand Dishwashing Detergent" (including antimicrobial), "Heavy-duty Hand Cleaner or Soap", "Medicated Astringent/Medicated Toner", or "Rubbing Alcohol."
- (6261)** "Glass Cleaner" means a cleaning product designed primarily for cleaning surfaces made of glass. Glass cleaner does not include products designed solely for the purpose of cleaning optical materials used in eyeglasses, photographic equipment, scientific equipment and photocopying machines.
- (6362)** "Hair Mousse" means a hairstyling foam designed to facilitate styling of a

coiffure and provide limited holding power.

- (6463)** “Hair Shine” means any product designed for the primary purpose of creating a shine when applied to the hair. “Hair Shine” includes, but is not limited to, dual-use products designed primarily to impart a sheen to the hair. “Hair Shine” does not include “Hairspray”, “Hair Mousse”, “Hair Styling Gel” or spray gel, or products whose primary purpose is to condition or hold the hair.
- (6564)** “Hair Styling Gel” means a high viscosity, often gelatinous, product that contains a resin and is designed for the application to hair to aid in styling and sculpting of the hair coiffure.
- (6665)** “Hairspray” means a consumer product designed primarily for the purpose of dispensing droplets of a resin on and into a hair coiffure which will impart sufficient rigidity to the coiffure to establish or retain the style for a period of time.
- (6766)** “Heavy-Duty Hand Cleaner or Soap” means a product designed to clean or remove difficult dirt and soils such as oil, grease, grime, tar, shellac, putty, printer s ink, paint, graphite, cement, carbon, asphalt, or adhesives from the hand with or without the use of water. “Heavy-duty Hand Cleaner or Soap” does not include prescription drug products, “Antimicrobial Hand or Body Cleaner or Soap”, “Astringent/Toner”, “Facial Cleaner or Soap”, “General-use Hand or Body Cleaner or Soap”, “Medicated Astringent/Medicated Toner” or “Rubbing Alcohol.”
- (6867)** “Herbicide” means a pesticide product designed to kill or retard a plant s growth, but excludes products that are: (A) for agricultural use, or (B) restricted materials that require a permit for use and possession.
- (6968)** “Household Product” means any consumer product that is primarily designed to be used inside or outside of living quarters or residences that are occupied or intended for occupation by individuals, including the immediate surroundings.
- ~~(67) “Household Sealants and Caulking Compounds” means any product designed to fill in cracks, close or secure an object, or to prevent seepage of moisture or air.~~
- (7069)** “Insect Repellent” means a pesticide product that is designed to be applied on human skin, hair or attire worn on humans in order to prevent contact with or repel biting insects or arthropods.
- (7170)** “Insecticide” means a pesticide product that is designed for use against

insects or other arthropods, but excluding products that are: (A) for agricultural use, or (B) for a use which requires a structural pest control license under Chapter 14 (commencing with Section 8500) of the Business and Professions Code, or (C) restricted materials that require a permit for use and possession.

- (7274)** "Insecticide Fogger" means any insecticide product designed to release all or most of its content, as a fog or mist, into indoor areas during a single application.
- (7372)** "Institutional Product" or "Industrial and Institutional (I&I) Product" means a consumer product that is designed for use in the maintenance or operation of an establishment that: (A) manufactures, transports, or sells goods or commodities, or provides services for profit; or (B) is engaged in the nonprofit promotion of a particular public, educational, or charitable cause. "Establishments" include, but are not limited to, government agencies, factories, schools, hospitals, sanitariums, prisons, restaurants, hotels, stores, automobile service and parts centers, health clubs, theaters, or transportation companies. "Institutional Product" does not include household products and products that are incorporated into or used exclusively in the manufacture or construction of the goods or commodities at the site of the establishment.
- (7473)** "Label" means any written, printed, or graphic matter affixed to, applied to, attached to, blown into, formed, molded into, embossed on, or appearing upon any consumer product or consumer product package, for purposes of branding, identifying, or giving information with respect to the product or to the contents of the package.
- (7574)** "Laundry Prewash" means a product that is designed for application to a fabric prior to laundering and that supplements and contributes to the effectiveness of laundry detergents and/or provides specialized performance.
- (7675)** "Laundry Starch Product" means a product that is designed for application to a fabric, either during or after laundering, to impart and prolong a crisp, fresh look and may also act to help ease ironing of the fabric. "Laundry Starch Product" includes, but is not limited to, fabric finish, sizing, and starch.
- (7776)** "Lawn and Garden Insecticide" means an insecticide product designed primarily to be used in household lawn and garden areas to protect plants from insects or other arthropods.
- (7877)** "Liquid" means a substance or mixture of substances which is capable of a visually detectable flow as determined under ASTM D-4359-90. "Liquid" does not include powders or other materials that are composed entirely of solid

particles.

**(7978)** “Lubricant” means a product designed to reduce friction, heat, noise, or wear between moving parts, or to loosen rusted or immovable parts or mechanisms. “Lubricant” does not include automotive power steering fluids; products for use inside power generating motors, engines, and turbines, and their associated power-transfer gearboxes; two cycle oils or other products designed to be added to fuels; products for use on the human body or animals or products that are (1) sold exclusively to establishments which manufacture or construct goods or commodities, and (2) labeled “not for retail sale”.

**(8079)** “LVP-VOC” means a chemical “compound” or “mixture” that contains at least one carbon atom and meets one of the following:

- (A) has a vapor pressure less than 0.1 mm Hg at 20°C, as determined by ARB Method 310; or
- (B) is a chemical “compound” with more than 12 carbon atoms, or a chemical “mixture” comprised solely of “compounds” with more than 12 carbon atoms, and the vapor pressure is unknown; or
- (C) is a chemical “compound” with a boiling point greater than 216°C, as determined by ARB Method 310; or
- (D) is the weight percent of a chemical “mixture” that boils above 216°C, as determined by ARB Method 310.

For the purposes of the definition of LVP-VOC, chemical “compound” means a molecule of definite chemical formula and isomeric structure, and chemical “mixture” means a substrate comprised of two or more chemical “compounds”.

**(8180)** “Manufacturer” means any person who imports, manufactures, assembles, produces, packages, repackages, or relabels a consumer product.

**(8284)** “Medicated Astringent/Medicated Toner” means any product regulated as a drug by the Food and Drug Administration (FDA) which is applied to the skin for the purpose of cleaning or tightening pores. “Medicated Astringent/Medicated Toner” includes, but is not limited to, clarifiers and substrate-impregnated products. “Medicated Astringent/Medicated Toner” does not include hand, face, or body cleaner or soap products, “Personal Fragrance Products”, “Astringent/Toner,” cold cream, lotion, antiperspirants, or products that must be purchased with a doctor’s prescription.

**(81)** ~~“Metallic Parts Cleaner” means any organic liquid that is designed to dissolve grease, dirt and other contaminants solely from miscellaneous metallic parts. “Metallic Parts Cleaner” does not include “Metal Polish/Cleanser”.~~

- (8382)** “Metal Polish/Cleanser” means any product designed primarily to improve the appearance of finished metal, metallic, or metallized surfaces by physical or chemical action. To “improve the appearance” means to remove or reduce stains, impurities, or oxidation from surfaces or to make surfaces smooth and shiny. “Metal Polish/Cleanser” includes, but is not limited to, metal polishes used on brass, silver, chrome, copper, stainless steel and other ornamental metals. “Metal Polish/Cleanser” does not include “Automotive Wax, Polish, Sealant or Glaze”, wheel cleaner, “Paint Remover or Stripper”, products designed and labeled exclusively for automotive and marine detailing, or products designed for use in degreasing tanks.
- (84)** “Mist spray adhesive” means any aerosol adhesive which is not a special purpose spray adhesive and which delivers a particle or mist spray, resulting in the formation of fine, discrete particles that yield a generally uniform and smooth application of adhesive to the substrate.
- (8583)** “Multi-purpose Dry Lubricant” means any lubricant which is: (A) designed and labeled to provide lubricity by depositing a thin film of graphite, molybdenum disulfide (“moly”), or polytetrafluoroethylene or closely related fluoropolymer (“teflon”) on surfaces, and (B) designed for general purpose lubrication, or for use in a wide variety of applications.
- (8684)** “Multi-purpose Lubricant” means any lubricant designed for general purpose lubrication, or for use in a wide variety of applications. “Multi-purpose Lubricant” does not include “Multi-purpose Dry Lubricants”, “Penetrants”, or “Silicone-based Multi-purpose Lubricants”.
- (8785)** “Multi-purpose Solvent” means 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.
- (8886)** “Nail Polish” means any clear or colored coating designed for application to the fingernails or toenails and including but not limited to, lacquers, enamels, acrylics, base coats and top coats.
- (8987)** “Nail Polish Remover” means a product designed to remove nail polish and coatings from fingernails or toenails.

- (9088)** “Non-Carbon Containing Compound” means any compound which does not contain any carbon atoms.
- (9189)** “Nonresilient Flooring” means flooring of a mineral content which is not flexible. “Nonresilient Flooring” includes terrazzo, marble, slate, granite, brick, stone, ceramic tile and concrete.
- (9290)** “Non-Selective Terrestrial Herbicide” means a terrestrial herbicide product that is toxic to plants without regard to species.
- (9394)** “Oven Cleaner” means any cleaning product designed to clean and to remove dried food deposits from oven walls.
- (9492)** “Paint” means any pigmented liquid, liquefiable, or mastic composition designed for application to a substrate in a thin layer which is converted to an opaque solid film after application and is used for protection, decoration or identification, or to serve some functional purpose such as the filling or concealing of surface irregularities or the modification of light and heat radiation characteristics.
- (9593)** “Paint Remover or Stripper” means any product designed to strip or remove paints or other related coatings, by chemical action, from a substrate without markedly affecting the substrate. “Paint Remover or Stripper” does not include “Multi-purpose Solvents”, paint brush cleaners, products designed and labeled exclusively to remove graffiti, and hand cleaner products that claim to remove paints and other related coatings from skin.
- (9694)** “Penetrant” means a lubricant designed and labeled primarily to loosen metal parts that have bonded together due to rusting, oxidation, or other causes. “Penetrant” does not include “Multi-purpose Lubricants” that claim to have penetrating qualities, but are not labeled primarily to loosen bonded parts.
- (9795)** “Person” shall have the same meaning as defined in Health and Safety Code Section 39047.
- (9896)** “Personal Fragrance Product” means any product which is applied to the human body or clothing for the primary purpose of adding a scent or masking a malodor, including cologne, perfume, aftershave, and toilet water. “Personal Fragrance Product” does not include: (A) products exclusively for human axillae; (B) medicated products designed primarily to alleviate fungal or bacterial growth on feet or other areas of the body; (C) mouthwashes, breath fresheners and deodorizers; (D) lotions, moisturizers, powders or other skin care products used primarily to alleviate skin conditions such as dryness and irritations; (E) products designed exclusively for use on human

genitalia; (F) soaps, shampoos, and products primarily used to clean the human body; and (G) fragrance products designed to be used exclusively on non-human animals.

- (9997)** "Pesticide" means and includes any substance or mixture of substances labeled, designed, or intended for use in preventing, destroying, repelling or mitigating any pest, or any substance or mixture of substances labeled, designed, or intended for use as a defoliant, desiccant, or plant regulator, provided that the term "pesticide" will not include any substance, mixture of substances, or device which the United States Environmental Protection Agency does not consider to be a pesticide.
- (10098)** "Principal Display Panel or Panels" means that part, or those parts of a label that are so designed as to most likely be displayed, presented, shown or examined under normal and customary conditions of display or purchase. Whenever a principal display panel appears more than once, all requirements pertaining to the "principal display panel" shall pertain to all such "principal display panels".
- (10199)** "Product Brand Name" means the name of the product exactly as it appears on the principal display panel of the product.
- (102400)** "Product Category" means the applicable category which best describes the product as listed in this Section 94508.
- (103404)** "Product Form", for the purpose of complying with Section 94513 only, means the applicable form which most accurately describes the product's dispensing form as follows:
- A = Aerosol Product
  - S = Solid
  - P = Pump Spray
  - L = Liquid
  - G = Gel
  - O = Other
- (104402)** "Propellant" means a liquefied or compressed gas that is used in whole or in part, such as a cosolvent, to expel a liquid or any other material from the same self-pressurized container or from a separate container.
- (105403)** "Pump Spray" means a packaging system in which the product ingredients within the container are not under pressure and in which the product is expelled only while a pumping action is applied to a button, trigger or other actuator.
- (106404)** "Responsible Party" means the company, firm or establishment which is listed

on the product's label. If the label lists two companies, firms or establishments, the responsible party is the party which the product was "manufactured for" or "distributed by", as noted on the label.

- (107405)** "Restricted Materials" means pesticides established as restricted materials under Title 3, California Code of Regulations, section 6400.
- (108406)** "Retailer" means any person who sells, supplies, or offers consumer products for sale directly to consumers.
- (109407)** "Retail Outlet" means any establishment at which consumer products are sold, supplied, or offered for sale directly to consumers.
- (110408)** "Rubber and Vinyl Protectant" means 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.
- (111409)** "Rubbing Alcohol" means any product containing isopropyl alcohol (also called isopropanol) or denatured ethanol and labeled for topical use, usually to decrease germs in minor cuts and scrapes, to relieve minor muscle aches, as a rubefacient, and for massage.
- (112410)** "Sealant and Caulking Compound" means any product with adhesive properties that is designed to fill, seal, waterproof, or weatherproof gaps or joints between two surfaces. "Sealant and Caulking Compound" does not include roof cements and roof sealants; insulating foams; removable caulking compounds; clear/paintable/water resistant caulking compounds; floor seam sealers; products designed exclusively for automotive uses; or sealers that are applied as continuous coatings. "Sealant and Caulking Compound" also does not include units of product, less packaging, which weigh more than one pound and consist of more than 16 fluid ounces. For the purposes of this definition only, "removable caulking compounds" means a compound which temporarily seals windows or doors for three to six month time intervals, and "clear/paintable/water resistant caulking compounds" means a compound which contains no appreciable level of opaque fillers or pigments; transmits most or all visible light through the caulk when cured; is paintable; and is immediately resistant to precipitation upon application.
- (113411)** "Semisolid" means a product that, at room temperature, will not pour, but will spread or deform easily, including gels, pastes, and greases.

- (114412) "Shaving Cream" means an aerosol product which dispenses a foam lather intended to be used with a blade or cartridge razor, or other wet-shaving system, in the removal of facial or other bodily hair.
- (115443) "Silicone-based Multi-purpose Lubricant" means any lubricant which is: (A) designed and labeled to provide lubricity primarily through the use of silicone compounds including, but not limited to, polydimethylsiloxane, and (B) designed and labeled for general purpose lubrication, or for use in a wide variety of applications. "Silicone-based Multi-purpose Lubricant" does not include products designed and labeled exclusively to release manufactured products from molds.
- (116414) "Single Phase Aerosol Air Freshener" means an aerosol air freshener with the liquid contents in a single homogeneous phase and which does not require that the product container be shaken before use.
- (117445) "Solid" means a substance or mixture of substances which, either whole or subdivided (such as the particles comprising a powder), is not capable of visually detectable flow as determined under ASTM D-4359-90.
- (118) Special purpose spray adhesive" means an aerosol adhesive that meets any of the following definitions:
- (A) "Mounting adhesive" means an aerosol adhesive designed to permanently mount photographs, artwork, and any other drawn or printed media to a backing (paper, board, cloth, etc.) without causing discoloration to the artwork.
- (B) "Flexible vinyl adhesive" means an aerosol adhesive designed to bond flexible vinyl to substrates. Flexible vinyl means a nonrigid polyvinyl chloride plastic with at least five percent, by weight, of plasticizer content. A plasticizer is a material, such as a high boiling point organic solvent, that is incorporated into a plastic to increase its flexibility, workability, or distensibility, and may be determined using ASTM Method E260-91 or from product formulation data.
- (C) "Polystyrene Foam Adhesive" means an aerosol adhesive designed to bond polystyrene foam (e.g. Styrofoam®, expanded polystyrene foam, etc.) to substrates.
- (D) "Automobile Headliner Adhesive" means an aerosol adhesive designed to bond together layers in motor vehicle headliners.
- (E) "Polyolefin Adhesive" means an aerosol adhesive designed to bond polyolefins (e.g. polyethylene, polypropylene, etc.) to substrates.

- (F) "High Pressure Laminate Adhesive" means an aerosol adhesive designed for the touch-up, repair, or edgebonding of high pressure laminates. For the purposes of this definition "high pressure laminate" means sheet materials which consist of paper, fabric, or other core material that have been laminated at temperatures exceeding 265 degrees F, and at pressures between 1,000 and 1,400 psi.
- (119416) "Spot Remover" means any product designed to clean localized areas, or remove localized spots or stains on cloth or fabric such as drapes, carpets, upholstery, and clothing, that does not require subsequent laundering to achieve stain removal. "Spot Remover" does not include "Dry Cleaning Fluid", "Laundry Prewash", "Carpet and Upholstery Cleaner", or "Multi-purpose Solvent".
- (120417) "Spray Buff Product" means a product designed to restore a worn floor finish in conjunction with a floor buffing machine and special pad.
- (121418) "Table B Compound" means any carbon-containing compound listed as an exception to the definition of VOC in Section 94508.
- (122419) "Terrestrial" means to live on or grow from land.
- (123420) "Tire Sealant and Inflator" means any pressurized product that is designed to temporarily inflate and seal a leaking tire.
- (124421) "Type A Propellant" means a compressed gas such as CO<sub>2</sub>, N<sub>2</sub>, N<sub>2</sub>O, or compressed air which is used as a propellant, and is either incorporated with the product or contained in a separate chamber within the product's packaging.
- (125422) "Type B Propellant" means any halocarbon which is used as a propellant including chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and hydrofluorocarbons (HFCs).
- (126423) "Type C Propellant" means any propellant which is not a Type A or Type B propellant, including propane, isobutane, n-butane, and dimethyl ether (also known as dimethyl oxide).
- (127424) "Undercoating" means any aerosol product designed to impart a protective, non-paint layer to the undercarriage, trunk interior, and/or firewall of motor vehicles to prevent the formation of rust or to deaden sound. "Undercoating" includes, but is not limited to, rubberized, mastic, or asphaltic products.
- (128425) "Usage Directions" means the text or graphics on the product's principal

display panel, label, or accompanying literature which describes to the end user how and in what quantity the product is to be used.

**(129126)** "Volatile Organic Compound (VOC)" means any compound containing at least one atom of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, and excluding the following:

- (A) methane,  
 methylene chloride (dichloromethane),  
 1,1,1-trichloroethane (methyl chloroform),  
 trichlorofluoromethane (CFC-11),  
 dichlorodifluoromethane (CFC-12),  
 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113),  
 1,2-dichloro-1,1,2,2-tetrafluoroethane (CFC-114),  
 chloropentafluoroethane (CFC-115),  
 chlorodifluoromethane (HCFC-22),  
 1,1,1-trifluoro-2,2-dichloroethane (HCFC-123),  
 1,1-dichloro-1-fluoroethane (HCFC-141b),  
 1-chloro-1,1-difluoroethane (HCFC-142b),  
 2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124),  
 trifluoromethane (HFC-23),  
 1,1,2,2-tetrafluoroethane (HFC-134),  
 1,1,1,2-tetrafluoroethane (HFC-134a),  
 pentafluoroethane (HFC-125),  
 1,1,1-trifluoroethane (HFC-143a),  
 1,1-difluoroethane (HFC-152a),  
 cyclic, branched, or linear completely methylated siloxanes,  
 the following classes of perfluorocarbons:
1. cyclic, branched, or linear, completely fluorinated alkanes;
  2. cyclic, branched, or linear, completely fluorinated ethers with no unsaturations;
  3. cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations; and
  4. sulfur-containing perfluorocarbons with no unsaturations and with the sulfur bonds to carbon and fluorine, and
- (B) the following low-reactive organic compounds which have been exempted by the U.S. EPA:

acetone,  
 ethane,  
 methyl acetate,  
 parachlorobenzotrifluoride (1-chloro-4-trifluoromethyl benzene),  
 perchloroethylene (tetrachloroethylene).

- (130427) "VOC Content" means the total weight of VOC in a product expressed as a percentage of the product weight (exclusive of the container or packaging), as determined pursuant to sections 94515(a) and (b).
- (131428) "Wasp and Hornet Insecticide" means any insecticide product that is designed for use against wasps, hornets, yellow jackets or bees by allowing the user to spray from a distance a directed stream or burst at the intended insects, or their hiding place.
- (132429) "Waterproofer" means a product designed and labeled exclusively to repel water from fabric or leather substrates. "Waterproofer" does not include "Fabric Protectants".
- (133430) "Wax" means a material or synthetic thermoplastic substance generally of high molecular weight hydrocarbons or high molecular weight esters of fatty acids or alcohols, except glycerol and high polymers (plastics). "Wax" includes, but is not limited to, substances derived from the secretions of plants and animals such as caruba wax and beeswax, substances of a mineral origin such as ozocerite and paraffin, and synthetic polymers such as polyethylene.
- (134) "Web spray adhesive" means any aerosol adhesive which is not a mist spray or special purpose spray adhesive.
- (135434) "Wood Floor Wax" means wax-based products for use solely on wood floors.

NOTE: Authority cited: sections 39600, 39601, and 41712, Health and Safety Code. Reference: sections 39002, 39600, 40000, and 41712, Health and Safety Code.

*Amend section 94509, title 17, CCR, to read as follows:*

**94509. Standards for Consumer Products**

- (a) Except as provided in Sections 94510 (Exemptions), 94511 (Innovative Products), 94514 (Variances), 94540 through 94555 (Alternative Control Plan), and 94567(a)(1) (Hairspray Credit Program), Title 17, California Code of Regulations, no person shall sell, supply, offer for sale, or manufacture for sale in California any consumer product which, at the time of sale or manufacture, contains volatile organic compounds in excess of the limits specified in the following Table of Standards after the specified effective dates.

[Note: The Table of Standards shown below is a condensed version which displays only the adhesives categories. No modifications are proposed to any of the other categories in the Table of Standards.]

**Table of Standards**  
**Percent Volatile Organic Compound by Weight**

Product Category	Effective Date <sup>1</sup>	VOC Standard <sup>2</sup>
Adhesives *:		
aerosol	1/1/95	75
[See 94509(i), 94512(d), and 94513(d) for additional requirements that apply to aerosol adhesives.] **	<u>1/1/2002</u>	<u>25</u>
<u>Mist Spray Adhesives</u>	<u>1/1/2002</u>	<u>65</u>
<u>Web Spray Adhesives</u>	<u>1/1/2002</u>	<u>55</u>
<u>Special Purpose Spray Adhesives</u>		
<u>mounting and flexible vinyl adhesives</u>	<u>1/1/2002</u>	<u>70</u>
<u>polystyrene foam and automobile headliner adhesives</u>	<u>1/1/2002</u>	<u>65</u>
<u>polyolefin and high pressure laminate adhesives</u>	<u>1/1/2002</u>	<u>60</u>
-----		
<u>construction, and panel, and floor covering***</u>	1/1/95	40
	<u>12/31/2002</u>	<u>15</u>
-----		
contact	1/1/95	80
-----		
general purpose	1/1/95	10
-----		
* See section 94510(j) for an exemption that applies to adhesives sold in containers of one fluid ounce or less.		
<del>** The Board will hold a public hearing by June 1, 2000, to review and consider any appropriate modifications to the 25 percent VOC limit for aerosol adhesives.</del>		
*** See section 94509(k) for the effective date of the VOC limit for certain types of "construction, panel, and floor covering adhesives."		

<sup>1</sup> See section 94509(d) for the effective date of the VOC standards for products registered under FIFRA, and section 94509(c) for the "Sell-through" allowed for products manufactured prior to the effective date of standards.

<sup>2</sup> See section 94510(c) for an exemption that applies to fragrances in consumer

products, and section 94510(d) for an exemption that applies to LVP-VOCs.

*[No changes are proposed to sections 94509(b) through 94509(h), title 17, CCR.]*

(i) *Requirements for aerosol adhesives.*

(1) As specified in Health and Safety Code section 41712(h)(2), the 75 percent VOC standard standards for aerosol adhesives applies to all uses of aerosol adhesives, including consumer, industrial, and commercial uses. Except as otherwise provided in sections 94510, 94511, and 94514, no person shall sell, supply, offer for sale, use or manufacture for sale in California any aerosol adhesive which, at the time of sale, use, or manufacture, contains VOCs in excess of 75 percent by weight the specified standard.

(2)(A) In order to qualify as a "Special Purpose Spray Adhesive" the product must meet one or more of the definitions specified in section 94508(a)(118), but if the product label indicates that the product is suitable for use on any substrate or application not listed in section 94508(a)(118), then the product shall be classified as either a "Web Spray Adhesive" or a "Mist Spray Adhesive."

(B) If a product meets more than one of the definitions specified in section 94508(a)(118) for "Special Purpose Spray Adhesive", and is not classified as a "Web Spray Adhesive" or "Mist Spray Adhesive" under subsection (2)(A), then the VOC limit for the product shall be the lowest applicable VOC limit specified in section 94509(a).

(3) Effective 1/1/2002, no person shall manufacture for use in California any aerosol adhesive which contains any of the following compounds: methylene chloride, perchloroethylene, or trichloroethylene.

(4) All aerosol adhesives must comply with the labeling requirements specified in section 94512(d), and all manufacturers and responsible parties for aerosol adhesives must comply with the special reporting requirements specified in section 94513(d).

*[No changes are proposed to sections 94509(j) or 94509(k), title 17, CCR.]*

NOTE: Authority cited: sections 39600, 39601, 39658, 39666, and 41712, Health and Safety Code. Reference: sections 39002, 39600, 39650, 39655, 39656, 39658, 39659, 39666, 40000, and 41712, Health and Safety Code.

*Amend section 94512 to add a new subsection (d), as follows:*

**94512. Administrative Requirements**

- (a) **Most Restrictive Limit.** Notwithstanding the definition of "product category" in Section 94508, if anywhere on the principal display panel of any consumer product, any representation is made that the product may be used as, or is suitable for use as a consumer product for which a lower VOC limit is specified in Section 94509(a), then the lowest VOC limit shall apply. This requirement does not apply to general purpose cleaners.
- (b) **Code-Dating.** Each manufacturer of a consumer product subject to Section 94509 shall clearly display on each consumer product container or package, the day, month, and year on which the product was manufactured, or a code indicating such date. This date or code shall be displayed on each consumer product container or package no later than twelve months prior to the effective date of the applicable standard specified in Section 94509. No person shall erase, alter, deface or otherwise remove or make illegible any date or code-date from any regulated product container without the express authorization of the manufacturer.

The requirements of this provision shall not apply to:

- (1) personal fragrance products of 2 milliliters or less, which are offered to consumers free of charge for the purpose of sampling the product; or
  - (2) products containing no VOCs (as defined in section 94508), or containing VOCs at 0.10% by weight or less.
- (c) If a manufacturer uses a code indicating the date of manufacture, for any consumer product subject to section 94509 an explanation of the code must be filed with the Executive Officer of the ARB no later than twelve months prior to the effective date of the applicable standard specified in section 94509.

**(d) Additional Labeling Requirements for Aerosol Adhesives.**

- (1) In addition to the requirements specified in subsections (a), (b) and (c), effective 1/1/2002, both the manufacturer and responsible party for each aerosol adhesive product subject to this article shall ensure that all products clearly display the following information on each product container which is manufactured 90 days or later after the effective date of this article:**

- (A) The aerosol adhesive category as specified in section 94509(a) shall be displayed:**

- (B) 1. The applicable VOC standard for the product that is specified in section 94509(a), expressed as a percentage by weight, shall be displayed unless the product is included in an alternative control plan approved by the Executive Officer, as provided in Article 4. Section 94540-94555, Title 17, California Code of Regulations, and the product exceeds the applicable VOC standard;
2. If the product is included in an alternative control plan approved by the Executive Officer, and the product exceeds the applicable VOC standard specified in section 94509(a), the product shall be labeled with the term "ACP" or "ACP product";
- (C) If the product is classified as a special purpose spray adhesive, the applicable substrate and/or application that qualifies the product as special purpose shall be displayed;
- (2) The information required in section 94512(d)(1), shall be displayed on the product container such that it is readily observable without removing or disassembling any portion of the product container or packaging.
- (3) No person shall remove, alter, conceal, or deface the information required in section 94512(d)(1) prior to final sale of the product.

NOTE: Authority cited: Sections 39600, 39601, and 41712, Health and Safety Code. Reference: Sections 39002, 39600, 40000, and 41712, Health and Safety Code.

*Amend section 94513(d), title 17, CCR, to read as follows:*

**94513. Reporting Requirements**

*[Note: No changes are proposed to subsections (a), (b), (c), or (e) of section 94513.]*

*(d) Special Reporting Requirements for Aerosol Adhesives*

On or before March 31, ~~1999~~2004, all responsible parties for aerosol adhesives shall report to the Executive Officer the following information for products sold or offered for sale in California:

- (1) data regarding product sales and composition for the year ~~1998~~2003, including the information listed in Section 94513(a), and any other

information that the Executive Officer may specify; and

- (2) a written update of the research and development efforts undertaken to achieve the January 1, 2002, VOC limits lower than the limits specified in section 94509(a). The written update must include detailed information about the raw materials (solvents, propellants, resins, and polymers) and hardware (valves, actuators, cans) used in product reformulation, the testing protocols used, the results of the testing, and the cost of reformulation efforts.

NOTE: Authority cited: sections 39600, 39601, 41511, and 41712, Health and Safety Code. Reference: sections 39002, 39600, 40000, 41511, and 41712, Health and Safety Code.

*[No changes are proposed to the remaining sections of the regulation.]*



**APPENDIX B: CRITERIA FOR DETERMINING TECHNOLOGICALLY AND  
COMMERCIALY FEASIBLE**



## **Criteria for Determining Technologically and Commercially Feasible**

Health and Safety code (HSC) section 41712 requires that the consumer product regulations be technologically and commercially feasible. Health and Safety Code section 41712 also requires aerosol adhesives, which are part of the consumer product regulations, to meet best available retrofit control technology (BARCT). Best available retrofit control technology is defined in the Health and Safety Code section 40406 as "an emission limitation that is based on the maximum degree of reduction achievable, taking into account environmental, energy, and economic impacts by each class or category of source." ARB staff has developed a guideline document to determine BARCT. The document is entitled Determination of Reasonably Available Control Technology and Best Available Retrofit Control Technology, March 1990. Criteria to determine whether the consumer product regulations are technologically and commercially feasible have also been developed and have been used in prior consumer product rulemakings. The criteria is summarized below.

### **Technologically Feasible**

Health and Safety Code section 41712(d) requires the Board to adopt consumer product regulations that are "technologically feasible." Technologically feasible is a different concept than "commercially feasible," and does not take into account the cost of the complying product. The 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.

### **Commercially Feasible**

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

types for consumers, as long as the basic market demand for new passenger automobiles could be generally met.

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

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

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

manufacture products with some specific attributes. The ARB staff believes that this approach complies with section 41712.



**APPENDIX C: MEETING NOTICES**



## MEETING NOTICES

Staff conducted one public meeting and one public workshop. These meetings were well attended by manufacturers and other interested parties. Staff also held three conference calls with NPCA and two conference calls with local districts and the US EPA.

A chronology of the meetings is shown below in Table C-1. Copies of the public meeting and workshop notices are included in this appendix.

**Table C-1: Summary of Meetings**

Date	Meeting
January 19, 1999	NPCA—discussed survey form
January 27, 1999	Meeting with industry representatives
April 16, 1999	Consumer Products Working Group (CPWG) meeting
June 29, 1999	Meeting with Bob Leon Plastics, Sacramento
July 1, 1999	Meeting with Midtown Framing and Gallery, Sacramento
July 15, 1999	Meeting with T-Shirt Productions, Sacramento
July 15, 1999	Meeting with AAA Garments and Lettering
August 17, 1999	Meeting with industry representatives
August 18, 1999	Meeting with industry representatives
August 25, 1999	Meeting with industry representatives
November 1, 1999	Meeting with industry representatives
November 8, 1999	Public Meeting
December 2, 1999	Meeting with Districts
January 11, 2000	NPCA—discussed Industry proposal
January 19, 2000	NPCA—discussed Industry proposal
January 20, 2000	Meeting with Districts
February 8, 2000	Public Workshop





**Winston H. Hickox**  
*Secretary for  
Environmental  
Protection*

# Air Resources Board

**Alan C. Lloyd, Ph.D.**

**Chairman**

2020 L Street • P.O. Box 2815 • Sacramento, California 95812 • [www.arb.ca.gov](http://www.arb.ca.gov)



**Gray Davis**  
*Governor*

October 13, 1999

Dear Sir or Madam:

The staff of the Air Resources Board invites you to a public meeting to discuss the feasibility of meeting the 25 percent volatile organic compound (VOC) standard for aerosol adhesives. The 25 percent standard will become effective on January 1, 2002.

As you may know, the consumer products regulations require the ARB staff to conduct a technical assessment of the feasibility of the standard and, if necessary, propose a new standard(s), reflective of best available retrofit control technology by June 1, 2000. The staff conducted a survey of aerosol adhesive manufacturers earlier this year and will be presenting its findings at the meeting. An agenda is enclosed for your information. The date, time, and location of the meeting are as follows:

Date: November 8, 1999  
Time: 1:15 p.m. to 4:00 p.m.  
Location: Air Resources Board  
4<sup>th</sup> Floor North & South Conference Rooms  
2020 L Street  
Sacramento, CA 95814

Presentations by individual companies are encouraged. If you plan to make a presentation, please contact Ms. Kim Nguyen, Air Resources Engineer, at (916) 327-1513 (e-mail at [knguyen@arb.ca.gov](mailto:knguyen@arb.ca.gov)) or Ms. Linda Lee, Air Resources Engineer, at (916) 327-1514 (e-mail at [llee@arb.ca.gov](mailto:llee@arb.ca.gov)). To participate by tele-conference, dial 888-422-7105 and give the participant code 589468.

We are also creating an aerosol adhesives mail list. If you would like to receive future notices, please fill out and return the enclosed form or e-mail Ms. Nguyen or Ms. Lee. All parties that reported sales or formulations in the 1998 aerosol adhesives survey will automatically be placed on the mail list.

California Environmental Protection Agency

*Printed on Recycled Paper*

Sir or Madam

October 13, 1999

Page 2

The meeting facility is accessible to persons with disabilities. If accommodation is needed, please contact Ms. Jacqueline Wilson at (916) 322-6020 by November 1, 1999. Persons with hearing or speech impairments can contact us by using our Telephone Device for the Deaf (TDD) at (916) 342-9531, or (800) 700-8326 for TDD calls outside the Sacramento area.

If you have any questions about the workshop, you may contact me at (916) 322-6020 or Mr. Gary M. Yee, Manager, Industrial Section, at (916) 327-5986 (e-mail at [gyee@arb.ca.gov](mailto:gyee@arb.ca.gov)).

Sincerely,



Dean C. Simeroth, Chief  
Criteria Pollutants Branch

Enclosures

cc: Gary Yee, Manager  
Industrial Section  
Stationary Source Division

## **AGENDA**

### **Public Meeting to Discuss the Feasibility of Meeting the 25 Percent VOC Standard for Aerosol Adhesives**

Air Resources Board  
4<sup>th</sup> Floor North and South Conference Rooms  
Sacramento, California  
November 8, 1999  
1:15 pm to 4 pm

- I. Introduction
- II. Staff Presentation
- III. Company Presentations
- IV. Discussion
- V. Closing



**AEROSOL ADHESIVES****APPLICATION TO ADD NAME TO MAIL LIST**

Please add my name to the Aerosol Adhesives Mail List:

Name \_\_\_\_\_  
Company \_\_\_\_\_  
Street/PO Box \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_  
Phone \_\_\_\_\_ Fax \_\_\_\_\_  
E-Mail \_\_\_\_\_

You can mail this application to

Ms. Linda Lee  
Air Resources Board  
P.O. Box 2815  
Sacramento, CA 95812

or you can fax this application to Ms. Lee at (916) 322-6088. You can also e-mail the information to [llee@arb.ca.gov](mailto:llee@arb.ca.gov) or [knguyen@arb.ca.gov](mailto:knguyen@arb.ca.gov). Please respond by November 12, 1999.

You must notify us if you wish to be placed on the mail list. All parties that reported sales or formulations in the 1998 aerosol adhesives survey will automatically be placed on the mail list.





Winston H. Hickox  
Agency Secretary

# Air Resources Board

Alan C. Lloyd, Ph.D.  
Chairman

2020 L Street • P.O. Box 2815 • Sacramento, California 95812 • [www.arb.ca.gov](http://www.arb.ca.gov)



Gray Davis  
Governor

January 10, 2000

Dear Sir or Madam:

The staff of the Air Resources Board invites you to a public workshop to discuss the feasibility of meeting the 25 percent volatile organic compound (VOC) standard for aerosol adhesives.

As you may know, the consumer products regulations require the ARB staff to conduct a technical assessment of the feasibility of the standard and, if necessary, propose a new standard(s), reflective of best available retrofit control technology by June 1, 2000. Staff conducted an industry survey in 1999 and held a public meeting in October 1999 to present the survey data. Based on the survey results and discussions with industry, the staff will discuss proposed new aerosol adhesive standards at the workshop. The draft proposed standards will be sent under separate cover. An agenda is enclosed for your information. The date, time, and location of the meeting are as follows:

Date: February 8, 2000  
Time: 1:00 p.m. to 4:00 p.m.  
Location: Air Resources Board  
4<sup>th</sup> Floor North & South Conference Rooms  
2020 L Street  
Sacramento, CA 95814

Presentations by individual companies are encouraged. If you plan to make a presentation, please contact Ms. Linda Lee, Air Resources Engineer, at (916) 327-1514 (e-mail at [llee@arb.ca.gov](mailto:llee@arb.ca.gov)). To participate by tele-conference, dial 888-422-7124 and give the participant code 409471.

The meeting facility is accessible to persons with disabilities. If accommodation is needed, please contact Ms. Jacqueline Wilson at (916) 322-6020 by January 31, 2000. Persons with hearing or speech impairments can contact us by using our Telephone Device for the Deaf (TDD) at (916) 342-9531, or (800) 700-8326 for TDD calls outside the Sacramento area.

Sir or Madam  
January 10, 2000  
Page 2

If you have any questions about the workshop, you may contact Mr. Gary M. Yee, Manager, Industrial Section, at (916) 327-5986 (e-mail at [gyee@arb.ca.gov](mailto:gyee@arb.ca.gov)).

Sincerely,

A handwritten signature in black ink, appearing to read "Dean C. Simeroth". The signature is fluid and cursive, with a large initial "D" and a long, sweeping tail.

Dean C. Simeroth, Chief  
Criteria Pollutants Branch

Enclosures

cc: Gary Yee, Manager  
Industrial Section  
Stationary Source Division

# AGENDA

## Public Workshop to Discuss the VOC Standard for Aerosol Adhesives

Air Resources Board  
4<sup>th</sup> Floor North and South Conference Rooms  
Sacramento, California  
February 8, 2000  
1:00 pm to 4 pm

- I. Introduction
- II. Staff Presentation
- III. Company Presentations
- IV. Discussion
- V. Closing





Winston H. Hickox  
Agency Secretary

# Air Resources Board

Alan C. Lloyd, Ph.D.  
Chairman

2020 L Street • P.O. Box 2815 • Sacramento, California 95812 • [www.arb.ca.gov](http://www.arb.ca.gov)



Gray Davis  
Governor

January 27, 2000

Dear Sir or Madam:

In a notice sent to you earlier this month, the staff of the Air Resources Board invited you to a public workshop to discuss the feasibility of meeting the 25 percent volatile organic compound (VOC) standard for aerosol adhesives.

The meeting is to be held at the following date/location:

Date: February 8, 2000  
Time: 1:00 p.m. to 4:00 p.m.  
Location: Air Resources Board Bldg.  
4<sup>th</sup> Floor Conference Room (North & South)  
2020 L Street  
Sacramento, CA 95814

At the workshop, we will be discussing a draft proposal by the aerosol adhesive industry to modify the current standards for aerosol adhesives (a summary of the draft proposal is enclosed). We will also be discussing the feasibility of prohibiting the use of methylene chloride and perchloroethylene in aerosol product formulations, and the need for a future technology review.

Presentations by individual companies are encouraged. If you plan to make a presentation, please contact Ms. Linda Lee, Air Resources Engineer, at (916) 327-1514 (e-mail at [lle@arb.ca.gov](mailto:lle@arb.ca.gov)). To participate by tele-conference, dial 888-422-7124 and give the participant code 409471.

The meeting facility is accessible to persons with disabilities. If accommodation is needed, please contact Ms. Jacqueline Wilson at (916) 322-6020. Persons with hearing or speech impairments can contact us by using our Telephone Device for the Deaf (TDD) at (916) 342-9531, or (800) 700-8326 for TDD calls outside the Sacramento area.

144

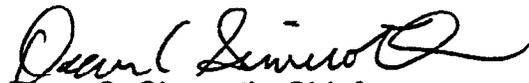
Sir or Madam

January 27, 2000

Page 2

If you have any questions about the workshop, you may contact Mr. Gary M. Yee, Manager, Industrial Section, at (916) 327-5986 (e-mail at [gyee@arb.ca.gov](mailto:gyee@arb.ca.gov)).

Sincerely,



Dean C. Simeroth, Chief  
Criteria Pollutants Branch

Enclosure

cc: Gary Yee, Manager  
Industrial Section  
Stationary Source Division

## **ARB Workshop on Aerosol Adhesives**

Air Resources Board Bldg.  
2020 L Street- 4<sup>th</sup> FL. Conf. Room (North&South)  
Sacramento, California  
February 8, 2000  
1:00 pm to 4 pm

### **A. Summary of Draft Proposal Submitted by the Aerosol Adhesive Industry**

- 1) Eliminate current 25 percent VOC standard effective 2002
- 2) Establish three new categories of standards effective 2002:
  - Special Purpose – 70 percent VOC
  - Other Mist Sprays – 65 percent VOC
  - Other Web Sprays – 55 percent VOC

### **B. Discuss Appropriate Category Definitions:**

Special Purpose

Other Mist Sprays

Other Web Sprays

### **C. Other Discussions**

- 1) Prohibition on the use of methylene chloride and perchloroethylene in the formulation of aerosol adhesives
- 2) Technology review in the year 2003 to determine if lower VOC standards can be achieved



**APPENDIX D: 1998 CARB AEROSOL ADHESIVES SURVEY**



**1998**  
***AEROSOL ADHESIVES SURVEY***

**March 3, 1999**

**ONLY USE THE SURVEY FORMS PROVIDED IN THIS PACKAGE, DO NOT USE ANY  
PREVIOUS CONSUMER PRODUCT SURVEY OR REGISTRATION FORMS.**

**THIS SURVEY IS MANDATORY.**

**DUE DATE: MAY 1, 1999**

California Environmental Protection Agency



**Air Resources Board**





# Air Resources Board



Alan C. Lloyd, Ph.D.  
Chairman

2020 L Street • P.O. Box 2815 • Sacramento, California 95812 • www.arb.ca.gov

Winston H. Hickox  
Secretary for  
Environmental  
Protection

Gray Davis  
Governor

March 3, 1999

Dear Sir/Madam:

Enclosed please find a copy of the Air Resources Board's (ARB) 1998 Aerosol Adhesives Survey (survey). The survey is intended to assist manufacturers and responsible parties in fulfilling the special reporting requirements in California's Consumer Product Regulations, Title 17, California Code of Regulations, section 94513(d), regarding aerosol adhesives that are marketed in California.

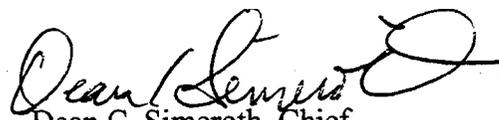
The special reporting requirements specify that each manufacturer or responsible party submit to the Executive Officer of the Air Resources Board (ARB) a written report of 1998 California sales and formulation data for each aerosol adhesive product by March 31, 1999. The regulations also specify that, by the same date, manufacturers shall submit a written report of research and development efforts undertaken to achieve the regulations' December 31, 2002, standard of 25% volatile organic compounds (VOCs).

The information you provide in the survey will assist the ARB staff in determining the technical feasibility of the 25% VOC standard. Also, the information will be used if necessary to determine an alternative standard(s) that represents best available retrofit control technology (BARCT) for aerosol adhesives.

We request that you use the survey to submit your aerosol adhesive products information as described. The deadline for requesting all data and information has been extended to **May 1, 1999**. The survey contains detailed instructions and questions and answers for your assistance.

If you have any questions concerning this letter or the survey, please contact Ms. Linda Lee, Air Resources Engineer, at (916) 327-1514 (e-mail llee@arb.ca.gov), or Ms. Kim Nguyen, Air Resources Engineer, at (916) 327-1513 (e-mail knguyen@arb.ca.gov).

Sincerely,

  
Dean C. Simeroth, Chief  
Criteria Pollutants Branch

Enclosures



**QUESTIONS AND ANSWERS REGARDING  
AEROSOL ADHESIVES SURVEY**

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**1. *What is an aerosol adhesive?***

The Consumer Products Regulations defines both "adhesive" and "aerosol adhesive." Section 94508, CCR, defines "adhesive" as any product that is used to bond one surface to another by attachment. The definition of "aerosol adhesive" is contained within the "adhesive" definition. An aerosol adhesive is an aerosol product in which the spray mechanism is permanently housed in a nonrefillable can designed for hand-held application [32 ounces or less] without the need for ancillary hoses or spray equipment. "Aerosol product" is defined as a pressurized spray system that dispenses product ingredients by means of a propellant or mechanically induced force.

**2. *What is a "Responsible Party?"***

The "Responsible Party" is the company, firm, or establishment which is listed on the label. If the label lists two companies, firms, or establishments, the responsible party is the party which the product was "manufactured for" or "distributed by," as noted on the label.

**3. *Must I still complete this survey form if I am not a Responsible Party?***

Yes, even if you are not a Responsible Party, please complete the top portion of **Form I: Company Information** and return this form to the following address:

California Air Resources Board  
Stationary Source Division  
Aerosol Adhesives Survey  
P.O. Box 2815  
Sacramento, CA 95812

For your convenience, the back of this form is already addressed and metered for postage. After completion, the form can be tri-folded, sealed, and dropped in the mail. You do not have to fill out any of the other forms.

**4. *If I have already filled out previous consumer product surveys, must I still complete this survey?***

Yes, you must still fill out this entire survey if you are a responsible party for an aerosol adhesive. The information requested in this survey is required by law. The ARB will be using this information to evaluate the VOC standard for aerosol adhesives contained in the Consumer Product Regulations.

**6. *If the survey information is claimed as confidential, how will it be treated?***

The ARB has adopted regulations to protect the confidentiality of trade secrets (Title 17, CCR, sections 90111 to 91022). A summary of ARB confidentiality regulations can be found in Attachment C of the survey package. You should fill out this form if you wish to designate any survey information as confidential. All information which you designate as confidential will be

**QUESTIONS AND ANSWERS REGARDING  
AEROSOL ADHESIVES SURVEY**

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handled strictly in accordance with ARB confidentiality regulations. In order to ensure that information deemed confidential is clearly identified, we have provided a box at the top of each page of the survey form to be checked if confidential information is provided on that page. The ARB has many years of experience in handling confidential information and takes its responsibilities very seriously. All confidential information will be kept in locked file cabinets and will be accessible to authorized ARB staff on an "as needed" basis only.

**1998**  
***AEROSOL ADHESIVES SURVEY***

**March 3, 1999**

**ONLY USE THE SURVEY FORMS PROVIDED IN THIS PACKAGE, DO NOT USE ANY  
PREVIOUS CONSUMER PRODUCT SURVEY OR REGISTRATION FORMS.**

**THIS SURVEY IS MANDATORY.**

**DUE DATE: MAY 1, 1999**

California Environmental Protection Agency

 **Air Resources Board**



## **Responsible Parties and Formulators**

**Please read this before filling out the survey.**

The "*Responsible Party*" means the company, firm or establishment which is listed on the label of an aerosol adhesive product covered by this survey. If the label lists two companies, firms or establishments, the responsible party is the party which the product was "manufactured for" or "distributed by", as noted on the label.

If you are **not** the Responsible Party for any aerosol adhesive product as covered by this survey, please complete the top portion of **Form I: Company Information only** and return this form to the following address:

California Air Resources Board  
Stationary Source Division  
Aerosol Adhesives survey  
2020 L Street  
P.O. Box 2815  
Sacramento, CA 95812

**Formulators:** Please fill out the Research and Development Section - Forms R&D\_Parts 1, 2, 3 and 4 even if you are not the responsible party.

*Italicized* words are defined in Attachment D.



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**TABLE OF CONTENTS**

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**THIS PACKET CONTAINS:**

- I. Survey Overview and Instructions
- II. Survey Forms and Sample Forms
- III. Attachments for completing the survey
  - Attachment A: List of Standard Industrial Classification (SIC) codes
  - Attachment B: United States Resident Population
  - Attachment C: Chemical Abstract Service (CAS) Numbers and Synonyms
  - Attachment D: Definitions
  - Attachment E: Title 17, California Code of Regulations, Section 91000 to 91100  
(The Air Resources Board's authority to collect information  
and the handling of confidential information)

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IF YOUR PACKET IS MISSING ANY ITEMS LISTED ABOVE, PLEASE CALL:

Ms. Linda Lee (916) 327-1514

Ms. Kim Nguyen (916) 327-1513

E-mail: llee@arb.ca.gov

E-mail: knguyen@arb.ca.gov

Facsimile number (916) 322-6088

**ONLY USE THE SURVEY FORMS PROVIDED IN THIS PACKAGE.  
DO NOT USE ANY PREVIOUS CONSUMER PRODUCT SURVEY  
OR REGISTRATION FORMS.**

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Part I  
**Survey Overview  
and Instructions**



**INSTRUCTIONS FOR COMPLETING THE  
1998 AEROSOL ADHESIVES SURVEY**

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**SURVEY OVERVIEW**

The Air Resources Board's (ARB) Aerosol Adhesives Survey is intended to collect information about *aerosol adhesives* as defined in the Consumer Products Regulations that were sold for use in California in 1998. **You must complete this survey if you are the *responsible party*.**

The *responsible party* is the company, firm or establishment which is listed on the product label. If the label lists two companies, firms or establishments, the responsible party is the party whom the product was "manufactured for" or "distributed by," as noted on the label.

If the responsible party is not the manufacturer/filler or not directly involved in the formulation of the product, they must identify the designated reporting party (manufacturer/filler or some other party) who will submit the survey to the ARB on their behalf. Otherwise, the responsible party and the designated reporting party may complete and submit the survey together. However, regardless of the arrangement, the responsible party is still legally responsible for ensuring that the survey is completed and submitted.

**We would like to emphasize that this survey is intended to collect information about all aerosol adhesives, including *consumer products*, *commercial products* (products used by household, commercial and institutional consumers), and *industrial products* (products designed and labeled exclusively for use in the manufacturing of goods or commodities). All consumer, commercial, and industrial products which are defined as aerosol adhesives must be reported.**

This survey consists of the following questionnaire forms and five attachments:

Company and Product Forms

- I: Company Information
- II: Formulator Information
- III: Product Sales
- IV-A: Product Ingredients (Responsible Party form)
- IV-B: Product Ingredients (Formulator form)

Research and Development Forms

- Part 1: Research Overview
- Part 2: Research and Development Results
- Part 3: Technology Tested
- Part 4: Technology Not Tested

Confidential Information Submittal Form

**SURVEY OVERVIEW**

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Attachment A:	List of Standard Industrial Classification (SIC) Codes
Attachment B:	United States Resident Population
Attachment C:	Chemical Abstract Service (CAS) Numbers and Synonyms
Attachment D:	Definitions
Attachment E:	Title 17, California Code of Regulations, Section 91000 to 91100 (The Air Resources Board's authority to collect information and the handling of confidential information)

Please read the instructions before completing this survey.

**Survey Due Date**

This survey is due **May 1, 1999**. Once it is completed, please send it to:

California Air Resources Board  
Stationary Source Division  
Aerosol Adhesives Survey  
P.O. Box 2815  
Sacramento, CA 95812  
**CONFIDENTIAL MATERIALS ENCLOSED**

**Confidential Information**

**The ARB will treat ALL information that you provide in this survey as Confidential.** Title 17, California Code of Regulations (CCR), Section 91000 to 91100 (Attachment E) describes the handling of Confidential Information. We also request that you review and complete the Confidential Information Submittal Form found in Part II, and submit a hard copy of it with your completed survey. Finally, for your protection, each page of the survey form has a box to check to indicate that the information on that page is confidential. The ARB takes extreme measures to ensure that all Confidential Information remains confidential pursuant to Title 17, CCR.

**Contact People**

If you have any questions, please contact the following staff:

Linda Lee	(916) 327-1514	llee@arb.ca.gov
Kim Nguyen	(916) 327-1513	knguyen@arb.ca.gov

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**INSTRUCTIONS FOR FORMS I AND II**

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**FORM I: COMPANY INFORMATION****FORM II: FORMULATOR INFORMATION**

The following instructions apply to Forms I and II. General company information such as name and address are needed, as well as fundamental information regarding the company. This information will assist us in determining the economic impacts of any proposed regulatory actions.

**Data Fields on Form I**

**Company Name; Division Name; Address; Contact Person Name, Phone Number, Fax Number, and E-mail Address; and Co. Website Address:** Complete as indicated on the form.

**Responsible Party:** Enter the appropriate answer in the box (yes or no) to indicate if your company is the *responsible party* (see definitions) for any *aerosol adhesive* products as defined in the Consumer Products Regulations (see definitions) that were sold in California in 1998. If you are not the *responsible party*, please stop here and submit this form to the ARB. For your convenience, the back of Form I is already addressed and metered for postage. The form can be tri-folded, sealed, and dropped in the mail.

**Standard Industrial Classification (SIC) Codes:** Enter the SIC codes applicable to your company's business (for example, one SIC code for Adhesives and Sealants Manufacturing is 2891). A list of SIC codes is provided in Attachment A. A listing of SIC codes can also be found on the internet at <http://www.osha.gov/oshstats/sicser.html>.

**Independent Ownership:** Enter the appropriate answer (yes or no) to indicate if the company is *independently owned*. Please refer to the Definitions in Attachment D for clarification of the terms in this question. If the company is not *independently owned*, enter the name and address of the *parent company* in the spaces provided.

**Employees Nationwide:** Enter the number of *employees* (including full-time, part-time and temporary staff) of the company or division nationwide. Please refer to the Definitions in Attachment D for clarification of the terms in this question.

**Contract Employees Nationwide:** Enter the number of *contract employees* of the company or division nationwide. Please refer to the Definitions in Attachment D for clarification of the terms in this question.

**California Employees:** Enter the number of *employees* (including full-time, part-time and temporary staff) of the company or division in California. Please refer to the Definitions in Attachment D for clarification of the terms in this question.

**INSTRUCTIONS FOR FORMS I AND II**

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**Contract Employees in California:** Enter the number of *contract employees* of the company or division in California. Please refer to the Definitions in Attachment D for clarification of the terms in this question.

**Gross Annual Receipts:** Enter the corresponding answer for the *typical gross annual receipts* generated by the company or division worldwide. Please refer to the Definitions in Attachment D for clarification of the terms in this question.

**Forwarding the Survey to Another Company for Formulation Data:** In the event you do not know the product formulation information required in Form IV-A: Product Ingredient, please do the following:

- 1) Indicate in the box provided on Form I that your company will be forwarding a copy of this survey to another company for completion.
- 2) Complete and submit to the ARB Form I, Form II, Form III (Enter NO for the question "Do you have all of the ingredient information for this product?" under the Product Ingredients section of Form III.), and Forms R&D Part 1 to Part 4.
- 3) Fill out the Responsible Party and Product Name section of Form IV-B, and forward this form with a blank copy of the entire survey to the formulator. This form has the Formulator Company Data section. Request that the formulator complete and submit this form to the ARB.

**Certification:** Please have a designated contact person certify the accuracy of the completed survey.

**Data Fields on Form II**

Complete as indicated on the form.

## INSTRUCTIONS FOR FORM III

**FORM III: PRODUCT SALES**

All product responses are to be placed on this form. There is one product or group of related products per form. Please make more copies of the form as needed and number the sheets in the space provided in the header. There are several things to remember as you complete this section of the survey:

- A) Only complete Form III if you are the *responsible party* for any *aerosol adhesives* that were sold in California in calendar year 1998.
- B) You may group products according to the criteria listed under the "Full Product Name" field below.
- C) The survey must be completed using data from calendar year 1998, or if these data are not available, the most recent twelve month consecutive period beginning no earlier than July 1, 1997.
- D) All aerosol adhesive products must be reported, regardless of whether they have been reported in previous ARB consumer products surveys.

**Data Fields****RESPONSIBLE PARTY AND PRODUCT NAME**

**Responsible Party Name and Formulator Name:** Complete as indicated on the form.

**Full Product Name:** Please provide the name of the product as shown on the *principal display panel* or a representative name for a group of products that have been aggregated. Products may be aggregated according to the following criteria:

- 1) All products must have the same Application Category as listed on Form III.
- 2) All products must be applicable to the same substrates as listed on Form III.
- 3) The products included in the group must have no greater than two percent variation in total volatile organic compound (VOC) content, where the difference is only due to the type or amount of *fragrance* or *colorant*.
- 4) List the names of the products to be aggregated on the back of Form III.

**SALES REPORTING OPTIONS:** You have two options for entering the sales of your product. Regardless of the option chosen, provide calendar year 1998 California sales data, or, if 1998 sales are not available, provide the sales for the most recent 4 quarters for which data are available. This period should begin no earlier than July 1, 1997.

**Option 1:**

Calculate the total 1998 product sales in California (in pounds less packaging) and enter this amount in the box provided.

## INSTRUCTIONS FOR FORM III

**Option 2:**

- a) List the product sizes and the estimated number of units sold in each size in California in 1998.
- b) Place an "X" in the Size Units box indicating whether your product size units are fluid ounces or weight ounces.
- c) If your size units are listed in fluid ounces, please provide either the density of the product in pounds per gallon or grams per milliliter, or provide the specific gravity. Spaces are provided for these entries.

**Estimating California Sales:** If California-specific sales data are not available, sales may be estimated using national or *regional* sales figures that are apportioned appropriately. If you use population as a basis for determining sales, please use the population estimates provided in Attachment B. If you are estimating sales by another method, please explain on the back of Form III.

**Entering Sales Data for Grouped Products:** If you are grouping products, please combine the sales of all grouped products. Be sure the individual product names are listed on the back of Form III.

**PRODUCT CATEGORY:**

**Type of Spray:** Place an "X" in the appropriate box.

**Type of Application:** Place an "X" in the box for each application type. Definitions of the *applications* are provided in Attachment D.

**Substrate:** Place an "X" in the box for each applicable substrate. If the substrate(s) is/are not listed, place an "X" in the "other" box and write in the substrate(s).

**PRODUCT INGREDIENTS:** Indicate in the box provided whether you have all of the ingredient information for the product and will be filling out the ingredient information, or you will be forwarding the Product Ingredients Form to your formulator. If YES, you may do one of the following: (1) Complete **Form IV-A** for the product, or (2) If the product was reported in the ARB's 1997 Consumer and Commercial Products Survey, dated February 28, 1998, please submit a copy of the product formulation data and complete the LVP-VOC section on Form IV-A. If NO, send **Form IV-B** to your formulator, and follow the forwarding instructions on page 4.

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**INSTRUCTIONS FOR FORMS IV-A AND IV-B**

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**FORM IV-A: PRODUCT INGREDIENTS (RESPONSIBLE PARTY FORM)****FORM IV-B: PRODUCT INGREDIENTS (FORMULATOR FORM)**

All product ingredient responses are to be placed on this form. Please use one sheet per product or group of products. Please make more copies of the form as needed and number the sheets in the space provided in the header. Please note: Use **Form IV-A** if you have all of the ingredient information for your product. If you are sending the product ingredient sheet to the formulator to complete, forward **Form IV-B** to your formulator. The survey forwarding instructions are on page 4.

**Data Fields****RESPONSIBLE PARTY AND PRODUCT NAME**

**Responsible Party Name:** This should be the same as the name on Form III.

**Full Product Name:** Please enter the name of the product or the representative name if a group of products have been aggregated. This should be the same as the name on Form III.

**INGREDIENT INFORMATION**

**VOC SPECIATION TABLE:** Every *volatile organic compound* (VOC) that amounts to 0.1 weight percent or more of the product must be listed. The total of all VOC ingredients which individually represent less than 0.1 weight percent of the product should be entered into the box at the bottom of the speciation table.

**Ingredient Name:** enter the name of the ingredient.

**CAS #:** Please enter the Chemical Abstract Service (CAS) number for the ingredient if available. A list of CAS numbers for a number of chemicals is included in Attachment C.

**Weight %:** Enter the percent by weight to the nearest 0.1% of the ingredient in the final product. If the ingredient is a mixture of known components, list the ingredients separately with their individual weight percentages in the final product. If the components of the mixture cannot be determined, list the ingredient as a single entity.

**Total VOC Content (Total A):** Sum the weight percentages for the VOC's listed in the table above, including the total of the VOC's which are individually less than 0.1% of the product.

**EXEMPT AND INORGANIC COMPOUNDS:** Enter the weight percent to the nearest 0.1% for each of the nine *exempt compounds* listed (acetone, carbon dioxide, HFC-152a, methyl acetate, methylene chloride, perchloroethylene, parachlorobenzotrifluoride, 1,1,1-TCA, *volatile methyl siloxanes*), and enter the weight percent of water. Aggregate the remaining exempt compounds and the remaining inorganic compounds and provide these weight percentages in "All other Exempt Compounds" and "All other Inorganic compounds," respectively. Finally,

INSTRUCTIONS FOR FORMS IV-A AND IV-B

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sum all of the exempt and inorganic compounds in the table above, and indicate this value in the Total Exempt/Inorganic box (**Total B**).

**LVP-VOC SOLVENT SPECIATION TABLE:** Every solvent contained in a *Low Vapor Pressure-Volatile Organic Compounds (LVP-VOC)* in amount of 0.1 weight percent or more of the product must be listed. If the product does not use a solvent in the *LVP-VOC* mixture, skip down to "Total LVP-VOC Solvents (**Total C**) and enter 0."

**Ingredient Name:** Enter the name of the ingredient.

**Trade Name:** Enter the trade name of the solvent, if known. This applies even if the trade name is the same as the solvent name. Please attach MSDS sheets if available.

**CAS #:** Please enter the Chemical Abstract Service (CAS) number for the solvent if available. A list of CAS numbers for a number of chemicals is included in Attachment C.

**Weight %:** Enter the percent by weight to the nearest 0.1% of the ingredient in the final product. If the ingredient is a mixture of known components, list the ingredients separately with their individual weight percentages in the final product. If the components of the mixture cannot be determined, list the ingredient as a single entity.

**Total LVP-VOC Solvents (Total C):** Sum the weight percentages for the solvents listed in the table above, including the total of the solvents which are individually less than 0.1% of the product. Enter this amount to the nearest 0.1 percent. If you have not listed any solvents in the table above, enter 0.

**Total Other LVP-VOC Content (Total D):** Aggregate the total weight percent for all *LVP-VOCs* that are not listed in the LVP-VOC Solvent Speciation Table and enter this amount to the nearest 0.1 percent. Other LVP-VOCs include rubber, resins, surfactants, etc.

**Total Ingredients:** The sum of Total A, Total B, Total C, and Total D **must equal 100 percent**. If this value does not sum to 100, check the component percentages for an error.

**INSTRUCTIONS FOR FORMS R&D\_PART 1 TO R&D\_PART 4**

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In the case that the responsible party is not the manufacturer/filler or not directly involved in the research and development of reformulated products, you do not have to complete this section of the survey.

**FORM R&D\_PART 1: RESEARCH OVERVIEW****Data Field**

**Company Name:** Enter your company name.

**Research and Development Efforts Update:** Please provide a general summary of your research and development efforts, successes and failures, to date for developing a product(s) with less than 75% VOC by weight. The discussion should include a brief description of the technologies (e.g., water-based, low VOC solvents/exempt compounds substitution) being pursued; any special packaging or valves being considered; any testing performed (e.g., prototype, stability, performance, consumer market/acceptance); and the results of the testing. Please make more copies of the form as needed and number the sheets in the space provided in the header. If other sheets of paper are used instead of this form, please number the sheets and indicate in the top right hand corner the name of the form (Form R&D\_Part 1).

**FORM R&D\_PART 2: RESEARCH AND DEVELOPMENT RESULTS****Data Fields**

**Company Name, Research and Development Results:** Complete as indicated on the form.

**FORM R&D\_PART 3: TECHNOLOGY TESTED**

Descriptions of the technology tested, alone or in combination, are to be placed on this form. Please make more copies of the form as needed and number the sheets in the space provided in the header.

**Data Fields**

**Company Name:** Complete as indicated on the form.

**Technology Description:** Please provide a detailed description of each of the technologies tested.

**INSTRUCTIONS FOR FORMS R&D\_PART 1 TO R&D\_PART 4**

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**Type of Application, and Substrate:** Complete as indicated on the form (for instructions, see Form III instructions on Product Category).

**Technological Advantages and Shortfalls:** Please provide a detailed description of the advantages and shortfalls encountered.

**Potential VOC Level:** Please determine a potential VOC level achievable with this technology. Please specify any stipulations and, if applicable, approximate the month and year when a product is expected to be available in California.

**Incremental Cost of Manufacturing:** Based on this technology, please estimate the incremental cost difference between manufacturing the potential reformulated product and the existing product in dollars per pound (\$/lb product). Provide cost in year 2000 dollars and assume an interest rate of 7.5% over 5 years.

**FORM R&D\_PART 4: TECHNOLOGY NOT TESTED SHEETS**

Please make more copies of the form as needed and number the sheets in the space provided in the header.

**Data Fields**

**Company Name:** Complete as indicated on the form.

**Technology Not Tested:** Please provide an explanation of why the technology was not tested. If the reason is cost, please include your estimate of the incremental cost of manufacturing using this technology. Please provide cost in year 2000 dollars and assume an interest rate of 7.5% over 5 years.

Part II

**Survey Forms**

(Blanks and Samples)



(Yes or No)

COMPANY INFORMATION

Company Name

Contact Person

Division Name (s)

Phone Number

Fax Number

Address

E-mail

Address

Co. Website

Address

RESPONSIBLE PARTY

(YES or NO)

(If no, stop here, and submit this form to ARB)

SIC CODES

INDEPENDENT OWNERSHIP

Is your company independently owned (Yes/No)?

If No, provide parent company information below.

Parent Company Name

Parent Company Address

NATIONWIDE EMPLOYEES

(0) None

(1) 1 to 10

(2) 11 to 100

(3) 101 to 250

(4) 251 to 500

(5) More than 500

CONTRACT EMPLOYEES (USA)

(0) None

(1) 1 to 10

(2) 11 to 100

(3) 101 to 250

(4) 251 to 500

(5) More than 500

CALIFORNIA EMPLOYEES

(0) None

(1) 1 to 10

(2) 11 to 100

(3) 101 to 250

(4) 251 to 500

(5) More than 500

CONTRACT EMPLOYEES (CA)

(0) None

(1) 1 to 10

(2) 11 to 100

(3) 101 to 250

(4) 251 to 500

(5) More than 500

GROSS ANNUAL RECEIPTS

(1) Less than \$250,000

(2) Between \$250,000 to \$1 million

(3) Between \$1 million and \$10 million

(4) Between \$10 million and \$100 million

(5) More than \$100 million

FORMULATION DATA

Are you forwarding the formulation data for one or more of your products to another company for completion (Yes or No)?

If Yes, please complete Form II: Formulator Information (next page).

CERTIFICATION

"I hereby certify that, to the best of my knowledge and belief, all information entered on the Company Information Form, Formulator Information Form, Product Sales Form, Product Ingredient Form, and Research and Development Forms is complete and accurate."

Name:

Title:

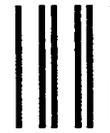
Signature:

Date Signed:

FOR ARB USE ONLY:

Company File Number

Product Number



NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES

**BUSINESS REPLY MAIL**  
First Class Permit No. 5219 Sacramento, CA 95812

Postage will be paid by addressee

California Air Resources Board  
Stationary Source Division  
Aerosol Adhesives Survey  
P.O. Box 2815  
Sacramento, CA 95812



Confidential  
(Yes or No)

AIR RESOURCES BOARD  
1998 AEROSOL ADHESIVES SURVEY

177 Form

II

FORMULATOR INFORMATION

If you have completed Form III: Product Sales for which you do not have the formulation data, please provide the company name, address and contact person's name and phone number in the spaces below.

RESPONSIBLE PARTY NAME

Form IV-B: Product Ingredients  
Sheet Number(s)

Formulator Name

Address

Contact  
Name

Phone  
Number

Form IV-B: Product Ingredients  
Sheet Number(s)

Formulator Name

Address

Contact  
Name

Phone  
Number

Form IV-B: Product Ingredients  
Sheet Number(s)

Formulator Name

Address

Contact  
Name

Phone  
Number

Form IV-B: Product Ingredients  
Sheet Number(s)

Formulator Name

Address

Contact  
Name

Phone  
Number

FOR ARB USE ONLY:

Company File Number

Product Number



(Yes or No)

PRODUCT SALES Sheet # \_\_\_ of \_\_\_

RESPONSIBLE PARTY AND PRODUCT NAME

Responsible Party Name

Formulator Name (If different than Responsible Party Name)

Full Product Name

SALES REPORTING OPTIONS

Option 1: Total CA Sales in Pounds

Option 2: Product Size Distribution Table

	Size	CA Units Sold
#1		
#2		
#3		
#4		
#5		
#6		

Size Units

Wt. Oz.

Fluid Oz.

(if fluid Oz, list one below)

Density, lb/Gal

Density, g/ml

Specific Gravity

PRODUCT CATEGORY

Type of Spray:

Lace

Particle

Type of Application:

Mounting

High Performance

Other, please list

Repositionable

General Purpose

Substrate (Check all that applies):

Ceramic

High Pressure Laminate

Styrofoam®

Expanded Polystyrene Foam

Leather

Vinyl

Fabric

Metal

Wood

Fiberglass

Paper

Other, please list

Glass

Rubber

PRODUCT INGREDIENTS

Do you have all of the ingredient information for this product (Yes or No)?

If YES complete Form IV-A: Product Ingredients entirely, Or if the product was reported in the ARB's "1997 Consumer and Commercial Products Survey," dated February 28, 1998, please submit copies of product formulation data and complete the LVP-VOC section on Form IV-A,

If NO, send Form IV-B: Product Ingredients to your formulator.

FOR ARB USE ONLY:

Company File Number

Product Number







(Yes or No)

PRODUCT INGREDIENTS Sheet # \_\_\_ of \_\_\_

RESPONSIBLE PARTY AND PRODUCT NAME

Responsible Party Name

Full Product Name

FORMULATOR COMPANY DATA

Formulator Company Name/Address

Contact Person

Phone/Fax  
Numbers

E-mail  
Address

INGREDIENT INFORMATION

VOC SPECIATION TABLE

EXEMPT AND INORGANIC  
COMPOUNDS

	Ingredient Name	CAS #	Wt. %
#1			
#2			
#3			
#4			
#5			
#6			
#7			
#8			
#9			
#10			
Total VOC ingredients each less than 0.1% by wt. of the product			

	Wt. %
Methyl Acetate	
Parachlorobenzotrifluoride	
Methylene Chloride	
1,1,1-Trichloroethane	
Volatile Methyl siloxanes	
Acetone	
Carbon Dioxide	
HFC-152a	
Water	
Perchloroethylene	
All Other Exempt Compds	
All Other Inorganic Compds	
(A) Total VOC Content	<input type="text"/>
(B) Total Exempt/Inorganic	<input type="text"/>

LVP-VOC SOLVENT SPECIATION TABLE

	Ingredient Name	Trade Name	CAS #	Wt. %
#1				
#2				
#3				
#4				
#5				
#6				
#7				
Total LVP-VOC Solvents each less than 0.1% by wt. of the product				

(C) Total LVP-VOC Solvents

(D) Total Other LVP-VOC Content

Total of A, B, C and D (MUST EQUAL 100 %)

FOR ARB USE ONLY:

Company File Number

Product Number



AIR RESOURCES BOARD  
1998 AEROSOL ADHESIVES SURVEY

185 Form  
**R&D**  
Part 1

Confidential  
(Yes or No)

RESEARCH OVERVIEW

Sheet # \_\_\_ of \_\_\_

COMPANY NAME

**Research and Development Efforts Update**

Please provide an overview of your research and development efforts, successes and failures, undertaken to achieve **VOC levels less than 75 percent by weight**. Your description should include the raw materials (solvents, propellants, resins, and polymers) and hardware (valves, actuators, cans) tested, the testing protocols used, and the results of the testing.

FOR ARB USE ONLY:

Company File Number

Product Number



**AIR RESOURCES BOARD  
1998 AEROSOL ADHESIVES SURVEY**

187 Form

**R&D  
Part 2**

Confidential  
(Yes or No)

**RESEARCH AND DEVELOPMENT RESULTS**

**COMPANY NAME**

**Research and Development Results**

Please indicate by checking the appropriate boxes which technologies you have tested:

Technology	Tested	Not Tested
Water-based		
Acetone		
Parachlorobenzotrifluoride		
Methyl Acetate		
Volatile Methyl Siloxanes		
Other Exempt Solvents Tested, please list:		
HFC-152a Propellant		
Carbon Dioxide Propellant		
Other Propellants Tested, please list:		
Increasing Solids Content		
Low Solvent Resin Technology		
Hardware		
Other Tested, please list:		

Please fill out **Form R&D\_Part 3** for technologies that you have tested. For technologies not tested, please indicate on **Form R&D\_Part 4** the reasons you have not explored these technologies. If the reason is economic, please include your estimate of the incremental cost of manufacturing using this technology.

**FOR ARB USE ONLY:**

Company File Number

Product Number



AIR RESOURCES BOARD  
1998 AEROSOL ADHESIVES SURVEY

189 Form  
**R&D**  
Part 3

Confidential  
(Yes or No)

TECHNOLOGY TESTED

Sheet # \_\_\_ of \_\_\_

COMPANY NAME

Technology Description:

Type of Application:

Mounting

Repositionable

High Performance

General Purpose

Other, please list

Substrate (Check all that applies):

Ceramic

Expanded Polystyrene Foam

Fabric

Fiberglass

Glass

High Pressure Laminate

Leather

Metal

Paper

Rubber

Styrofoam®

Vinyl

Wood

Other, please list

Technological Advantages or Shortfalls:

Potential VOC Level (alone or in combination), please specify any stipulations and timeframe:

Incremental Cost of Manufacturing:

FOR ARB USE ONLY:

Company File Number

Product Number



AIR RESOURCES BOARD  
1998 AEROSOL ADHESIVES SURVEY

Form

**R&D**

**Part 4**

Confidential  
(Yes or No)

TECHNOLOGY NOT TESTED Sheet # \_\_\_ of \_\_\_

COMPANY NAME

Technology Not Tested:

Technology Not Tested:

Technology Not Tested:

FOR ARB USE ONLY:

Company File Number

Product Number



**CONFIDENTIAL INFORMATION SUBMITTAL FORM**

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If you wish to designate any information contained in your survey data as **CONFIDENTIAL INFORMATION**, please provide the data requested below and return it with your completed survey form.

In accordance with Title 17, California Code of Regulations (CCR), Section 91000 to 91022, and the California Public Records Act (Government Code Section 6250 et seq.), the information that a company provides to the Air Resources Board (ARB) may be released (1) to the public upon request, except trade secrets which are not emissions data or other information which is exempt from disclosure or the disclosure of which is prohibited by law, and (2) to the Federal Environmental Protection Agency (EPA), which protects trade secrets as provided in Section 114(c) of the Clean Air Act and amendments thereto (42 USC 7401 et seq.) and in federal regulation, and (3) to other public agencies provided that those agencies preserve the protections afforded information which is identified as a trade secret, or otherwise exempt from disclosure by law (Section 39660(e)).

Trade secrets as defined in Government Code Section 6254.7 are not public records and therefore will not be released to the public. However, the California Public Records Act provides that air pollution emission data are always public records, even if the data comes within the definition of trade secrets. On the other hand, the information used to calculate information is a trade secret.

If any company believes that any of the information it may provide is a trade secret or otherwise exempt from disclosure under any other provision of law, **it must identify the confidential information as such at the time of submission to the ARB and must provide the name address, and telephone number of the individual to be consulted**, if the ARB receives a request for disclosure or seeks to disclose the data claimed to be confidential. The ARB may ask the company to provide documentation of its claim of trade secret or exemption at a later date. Data identified as confidential will not be disclosed unless the ARB determines, in accordance with the above referenced regulations, that the data do not qualify for a legal exemption from disclosure. The regulations establish substantial safeguards before any such disclosure.

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In accordance with the provisions of Title 17, California Code of Regulations, Section 91000 to 91022, and the California Public Records Act (Government Code Sections 6250 et seq.),

**Company Name:** \_\_\_\_\_ declares that all the information submitted in response to the California Air Resources Board's information request on the 1997 LVP-VOC Survey for Consumer and Commercial Products is confidential "trade secret" information, and request that it be protected as such from public disclosure. All inquiries pertaining to the confidentiality of this information should be directed to the following person:

Date: \_\_\_\_\_

Mailing Address:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

(Signature)

(Printed Name)

(Title)

(Telephone Number)

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



(Yes or No)

COMPANY INFORMATION

Company Name

THE STICKY GLUE CO.

Contact Person

JOE SMITH

Division Name (s)

AEROSOL DIVISION

Phone Number

(818) 123-4567

Fax Number

(818) 123-4000

E-mail

Address

jsmith@stickyglue.com

Address

1998 AA SURVEY STREET  
LOS ANGELES, CA 91342

Co. Website

Address

www.stickyglue.com

RESPONSIBLE PARTY

(YES or NO)

YES

(If no, stop here, and submit this form to ARB)

SIC CODES

2891

5169

5199

INDEPENDENT OWNERSHIP

Is your company independently owned (Yes/No)?

YES

If No, provide parent company information below.

Parent Company Name

Parent Company Address

NATIONWIDE EMPLOYEES

- (0) None
- (1) 1 to 10
- (2) 11 to 100
- (3) 101 to 250
- (4) 251 to 500
- (5) More than 500

2

CONTRACT EMPLOYEES (USA)

- (0) None
- (1) 1 to 10
- (2) 11 to 100
- (3) 101 to 250
- (4) 251 to 500
- (5) More than 500

0

CALIFORNIA EMPLOYEES

- (0) None
- (1) 1 to 10
- (2) 11 to 100
- (3) 101 to 250
- (4) 251 to 500
- (5) More than 500

2

CONTRACT EMPLOYEES (CA)

- (0) None
- (1) 1 to 10
- (2) 11 to 100
- (3) 101 to 250
- (4) 251 to 500
- (5) More than 500

0

GROSS ANNUAL RECEIPTS

- (1) Less than \$250,000
- (2) Between \$250,000 to \$1 million
- (3) Between \$1 million and \$10 million
- (4) Between \$10 million and \$100 million
- (5) More than \$100 million

3

FORMULATION DATA

Are you forwarding the formulation data for one or more of your products to another company for completion (Yes or No)?

If Yes, please complete Form II: Formulator Information (next page).

YES

CERTIFICATION

"I hereby certify that, to the best of my knowledge and belief, all information entered on the Company Information Form, Formulator Information Form, Product Sales Form, Product Ingredient Form, and Research and Development Forms is complete and accurate."

Name: JOE SMITH

Title: SENIOR SPECIALIST, REGULATORY AFFAIRS

Signature:

Date Signed:

4/15/1999

FOR ARB USE ONLY:

Company File Number

Product Number

Confidential  
196  
(Yes or No)

AIR RESOURCES BOARD  
1998 AEROSOL ADHESIVES SURVEY

Form  
**SAMPLE II**

FORMULATOR INFORMATION

If you have completed Form III: Product Sales for which you do not have the formulation data, please provide the company name, address and contact person's name and phone number in the spaces below.

RESPONSIBLE PARTY NAME

THE STICKY GLUE CO.

Form IV-B: Product Ingredients  
Sheet Number(s)

1, 2, 3

Formulator Name

FOUR SEASONS CHEMICAL CO.

Address

1999 SOUTH SUBMITTAL LANE  
LOS ANGELES, CA 91340

Contact  
Name

Phone  
Number

Form IV-B: Product Ingredients  
Sheet Number(s)

Formulator Name

Address

Contact  
Name

Phone  
Number

Form IV-B: Product Ingredients  
Sheet Number(s)

Formulator Name

Address

Contact  
Name

Phone  
Number

Form IV-B: Product Ingredients  
Sheet Number(s)

Formulator Name

Address

Contact  
Name

Phone  
Number

FOR ARB USE ONLY:

Company File Number

Product Number

(Yes or No)

PRODUCT SALES

Sheet # 1 of 10

**RESPONSIBLE PARTY AND PRODUCT NAME**

Responsible Party Name

THE STICKY GLUE CO.

Formulator Name (If different than Responsible Party Name)

FOUR SEASONS CHEMICAL CO.

Full Product Name

ALL PURPOSE SPRAY ADHESIVE 101

**SALES REPORTING OPTIONS**

Option 1: Total CA Sales in Pounds

Option 2: Product Size Distribution Table

	Size	CA Units Sold
#1	12	4,000
#2		
#3		
#4		
#5		
#6		

Size Units

Wt. Oz.

Fluid Oz.

(if fluid Oz, list one below)

Density, lb/Gal

Density, g/ml

Specific Gravity

**PRODUCT CATEGORY**

Type of Spray:

Lace

Particle

Type of Application:

Mounting

High Performance

Other, please list

Repositionable

General Purpose

Substrate (Check all that applies):

Ceramic

High Pressure Laminate

Styrofoam®

Expanded Polystyrene Foam

Leather

Vinyl

Fabric

Metal

Wood

Fiberglass

Paper

Other, please list

Glass

Rubber

**PRODUCT INGREDIENTS**

Do you have all of the ingredient information for this product (Yes or No)?

NO

If YES complete Form IV-A: Product Ingredients entirely, Or if the product was reported in the ARB's "1997 Consumer and Commercial Products Survey," dated February 28, 1998, please submit copies of product formulation data and complete the LVP-VOC section on Form IV-A,

If NO, send Form IV-B: Product Ingredients to your formulator.

FOR ARB USE ONLY:

Company File Number

Product Number

(Yes or No) **198**

**YES**

**PRODUCT INGREDIENTS** Sheet # 1 of 10

**RESPONSIBLE PARTY AND PRODUCT NAME**

Responsible Party Name

THE STICKY GLUE CO.

Full Product Name

ALL PURPOSE SPRAY ADHESIVES 101

**FORMULATOR COMPANY DATA**

Formulator Company Name/Address

FOUR SEASONS CHEMICAL CO.  
1999 SOUTH SUBMITTAL LANE  
LOS ANGELES, CA 91340

Contact Person

ALBERT E. SEASONS

Phone/Fax  
Numbers

(818) 987-6543

(818) 987-6000

E-mail  
Address

aseasons@seasonschem.com

**INGREDIENT INFORMATION**

**VOC SPECIATION TABLE**

**EXEMPT AND INORGANIC COMPOUNDS**

	Ingredient Name	CAS #	Wt. %
#1	DIMETHYL ETHER	115106	20.5
#2	PROPANE	74986	10.6
#3	ISOBUTANE	75285	24.9
#4			
#5			
#6			
#7			
#8			
#9			
#10			
Total VOC ingredients each less than 0.1% by wt. of the product			0.0

Methyl Acetate	
Parachlorobenzotrifluoride	
Methylene Chloride	
1,1,1-Trichloroethane	
Volatile Methyl siloxanes	
Acetone	15.5
Carbon Dioxide	
HFC-152a	
Water	
Perchloroethylene	
All Other Exempt Compds	
All Other Inorganic Compds	

(A) Total VOC Content **56**

(B) Total Exempt/Inorganic **15.5**

**LVP-VOC SOLVENT SPECIATION TABLE**

	Ingredient Name	Trade Name	CAS #	Wt. %
#1	SPECIALTY ALKYLATE 7050	SPECIALTY ALKYLATE 7050	94094-93-6	5.0
#2	VISTA 47 SOLVENT	VISTA 47 SOLVENT	64742-47-8	5.1
#3				
#4				
#5				
#6				
#7				
Total LVP-VOC Solvents each less than 0.1% by wt. of the product				0.0

(C) Total LVP-VOC Solvents **10.1**

(D) Total Other LVP-VOC Content **18.4**

Total of A, B, C and D (MUST EQUAL 100 %) **100**

**FOR ARB USE ONLY:**

Company File Number

Product Number

AIR RESOURCES BOARD  
1998 AEROSOL ADHESIVES SURVEY

199

Form

Confidential  
(Yes or No)

SAMPLE

R&D  
Part 1

YES

RESEARCH OVERVIEW

Sheet # \_\_\_ of \_\_\_

COMPANY NAME

THE STICKY GLUE CO.

Research and Development Efforts Update

Please provide an overview of your research and development efforts, successes and failures, undertaken to achieve **VOC levels less than 75 percent by weight**. Your description should include the raw materials (solvents, propellants, resins, and polymers) and hardware (valves, actuators, cans) tested, the testing protocols used, and the results of the testing.

**[Note: This is an example. The "..." placeholders represent areas where further explanation is expected.]**

We have been researching the following technologies: (1) water-based technology, and (2) substituting VOC solvents with acetone and HFC-152a.

(1) Water-based technology:

The major ingredients are: water, XX1 propellants, YY1 polymers, ZZ1 resins and antioxidants. All materials are readily available either inhouse or through our supplier. These formulations require special processing which is beyond our capability at this time.

We have conducted comparison tests to match product attributes with our existing general purpose spray adhesives. We evaluated such parameters as: flammability, adhesion strength on various substrates, dry time, spray patterns, ... We did not use standard test methods. Descriptions of laboratory/field testing performed are attached.

There is potential with this technology. We expect to reformulate products down to 5%. However, drawbacks include slower dry time, poor performance on paper, ... Despite the drawbacks, this technology is promising and we will continue with our research (OR, The potential for this technology is limited due to the following factors...

(2) Reformulating with acetone

.....

(3) Reformulating with HFC-152a

.....

FOR ARB USE ONLY:

Company File Number

Product Number

Confidential  
(Yes or No)

YES

## RESEARCH AND DEVELOPMENT RESULTS

COMPANY NAME

THE STICKY GLUE CO.

## Research and Development Results

Please indicate by checking the appropriate boxes which technologies you have tested:

Technology	Tested	Not Tested
Water-based	X	
Acetone	X	
Parachlorobenzotrifluoride		X
Methyl Acetate		X
Volatile Methyl Siloxanes		X
Other Exempt Solvents Tested, please list:		
HFC-152a Propellant	X	
Carbon Dioxide Propellant		X
Other Propellants Tested, please list:		
Increasing Solids Content		X
Low Solvent Resin Technology		X
Hardware		X
Other Tested, please list:		

Please fill out **Form R&D\_Part 3** for technologies that you have tested. For technologies not tested, please indicate on **Form R&D\_Part 4** the reasons you have not explored these technologies. If the reason is economic, please include your estimate of the incremental cost of manufacturing using this technology.

FOR ARB USE ONLY:

Company File Number

Product Number

AIR RESOURCES BOARD  
1998 AEROSOL ADHESIVES SURVEY

SAMPLE 201

Form  
**R&D**  
Part 3

Confidential  
(Yes or No)

YES

TECHNOLOGY TESTED

Sheet # 1 of 3

COMPANY NAME

THE STICKY GLUE CO.

**Technology Description:**

Water-based with XX1 Propellants, YY1 polymers, ZZ1 resins, and antioxidants.

*[Note: This is an example. R&D Part 3 sheets should also be filled out for acetone and HFC-152a. The "..." placeholders represent areas where further detail is expected.]*

**Type of Application:**

Mounting

High Performance

Other, please list

Repositionable

General Purpose

**Substrate (Check all that applies):**

Ceramic

High Pressure Laminate

Styrofoam®

Expanded Polystyrene Foam

Leather

Fabric

Metal

Fiberglass

Paper

Glass

Rubber

Wood

Other, please list

**Technological Advantages or Shortfalls:**

Avantages include lower VOC, ...

Shortfalls include freeze/thaw instability, slow drying time, ...

**Potential VOC Level (alone or in combination), please specify any stipulations and timeframe:**

Potential VOC level of 20 wt. % without any restrictions. At 5 wt.% VOC, expect unacceptable drying time and poor performance on paper type products. We expect to have products at 20 wt. % by January 2002.

**Incremental Cost of Manufacturing:**

About \$2/lb for products at 20 wt. % VOC.

FOR ARB USE ONLY:

Company File Number

Product Number

202  
Confidential  
(Yes or No)

YES

TECHNOLOGY NOT TESTED Sheet # 1 of 1

COMPANY NAME

THE STICKY GLUE CO.

**Technology Not Tested:**

Parachlorobenzotrifluoride: Incompatible with current resins used, ...

Methyl Acetate: ...

Volatile Methyl siloxanes: ...

*[Note: This is an example. For each untested technology, please provide the reasons why the technology was not considered. The "..." placeholders represent areas where further detail is expected.]*

**Technology Not Tested:**

Carbon Dioxide Propellant: Difficult to maintain constant pressure in can, ...

**Technology Not Tested:**

Increasing Solids Content: ...

Low Solvent Resin Technology: ...

Hardware: ...

FOR ARB USE ONLY:

Company File Number

Product Number

CONFIDENTIAL INFORMATION SUBMITTAL FORM

If you wish to designate any information contained in your survey data as **CONFIDENTIAL INFORMATION**, please provide the data requested below and return it with your completed survey form.

In accordance with Title 17, California Code of Regulations (CCR), Section 91000 to 91022, and the California Public Records Act (Government Code Section 6250 et seq.), the information that a company provides to the Air Resources Board (ARB) may be released (1) to the public upon request, except trade secrets which are not emissions data or other information which is exempt from disclosure or the disclosure of which is prohibited by law, and (2) to the Federal Environmental Protection Agency (EPA), which protects trade secrets as provided in Section 114(c) of the Clean Air Act and amendments thereto (42 USC 7401 et seq.) and in federal regulation, and (3) to other public agencies provided that those agencies preserve the protections afforded information which is identified as a trade secret, or otherwise exempt from disclosure by law (Section 39660(e)).

Trade secrets as defined in Government Code Section 6254.7 are not public records and therefore will not be released to the public. However, the California Public Records Act provides that air pollution emission data are always public records, even if the data comes within the definition of trade secrets. On the other hand, the information used to calculate information is a trade secret.

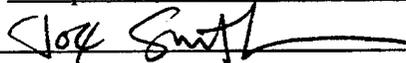
If any company believes that any of the information it may provide is a trade secret or otherwise exempt from disclosure under any other provision of law, **it must identify the confidential information as such at the time of submission to the ARB and must provide the name address, and telephone number of the individual to be consulted**, if the ARB receives a request for disclosure or seeks to disclose the data claimed to be confidential. The ARB may ask the company to provide documentation of its claim of trade secret or exemption at a later date. Data identified as confidential will not be disclosed unless the ARB determines, in accordance with the above referenced regulations, that the data do not qualify for a legal exemption from disclosure. The regulations establish substantial safeguards before any such disclosure.

In accordance with the provisions of Title 17, California Code of Regulations, Section 91000 to 91022, and the California Public Records Act (Government Code Sections 6250 et seq.),

**Company Name:** The Sticky Glue Co. declares that all the information submitted in response to the California Air Resources Board's information request on the 1997 LVP-VOC Survey for Consumer and Commercial Products is confidential "trade secret" information, and request that it be protected as such from public disclosure. All inquiries pertaining to the confidentiality of this information should be directed to the following person:

Date: April 15, 1999

Mailing Address:



(Signature)

The Sticky Glue Co.

Joe Smith

(Printed Name)

Aerosol Division

Senior Specialist, Regulatory Affairs

(Title)

1998 AA Survey Street

(818) 123-4567

(Telephone Number)

Los Angeles, CA 91342



**Part III**  
**Attachments for Completing the**  
**Survey**



## ATTACHMENT A

## COMMON SIC CODES FOR CONSUMER AND COMMERCIAL PRODUCTS

I. **Manufacturers:**

<u>Code*</u>	<u>Description</u>	<u>Examples</u>
2079	Edible Fats and Oils, Nec	Aerosol Nonstick Pan Sprays
2834	Pharmaceutical Preparations	Prescription and OTC Drugs
<b>2841</b>	Soap and Other Detergents	Laundry Detergent
<b>2842</b>	Specialty Cleaning, Polishing & Sanitation Preparations	Floor Wax, Disinfectant, Degreasers
<b>2844</b>	Perfumes, Cosmetics & Other Toilet Preps.	Hairspray, Deodorant, Toothpaste
<b>2851</b>	Paints and Allied Products	Paint Thinner, Paint Remover, Putty
<b>2879</b>	Pesticides and Agricultural Chemicals, Nec	Household Insecticides & Herbicides
<b>2891</b>	Adhesives and Sealants	Caulking
<b>2899</b>	Chemical Preparations, Nec	Antifreeze
<b>2992</b>	Lubricating Oils and Greases	Lubricants

\* All codes under "Manufacturing." Bolded codes expected to apply to most products.

II. **Wholesalers:**

<u>Code**</u>	<u>Description</u>	<u>Examples</u>
5112	Stationary and Office Supplies	Photocopy Supplies, Pens
<b>5122</b>	Drugs, Drug Proprietarys, Sundries	Hairspray, Perfume, Antiseptics
5149	Groceries, and Related Products, Nec	Aerosol Whipped Cream
<b>5169</b>	Chemicals and Allied Products, Nec	Laundry Soap, Polishes, Turpentine
<b>5198</b>	Paints, Varnishes, and Supplies	Shellac, Varnish, Enamel
<b>5199</b>	Nondurable Goods, Nec	Artists' Materials

\*\* All codes under "Wholesale Trade." Bolded codes expected to apply to most products.

III **Retailers:**

<u>Code***</u>	<u>Description</u>	<u>Examples</u>
<b>5231</b>	Paint, Glass and Wallpaper Stores	Paint Thinner, Paint Remover
<b>5251</b>	Hardware Stores	Adhesives, Caulking Compounds
<b>5261</b>	Retail Nurseries, Lawn and Garden Supply	Herbicides, Insecticides

Note: nec means "not elsewhere classified."

## ATTACHMENT A

## COMMON SIC CODES FOR CONSUMER AND COMMERCIAL PRODUCTS

## III Retailers (Cont'd):

<u>Code</u> ***	<u>Description</u>	<u>Examples</u>
5311	Department Stores	Various Personal Care Products
5331	Variety Stores	Numerous
<b>5399</b>	Miscellaneous General Merchandise Stores	Numerous
<b>5411</b>	Grocery Stores	Numerous
<b>5511</b>	Motor Vehicle Dealers (new and used)	Windshield Washer Fluids
5531	Auto and Home Supply Stores	Multipurpose Lubricants
5541	Gasoline Service Stations	Lubricants
5941	Sporting Goods Stores and Bicycle Shops	Lubricants
5961	Catalog and Mail-Order Houses	Numerous
5963	Direct Selling Establishments	Numerous
5999	Miscellaneous Retail Stores, nec	Numerous

\*\*\* All codes under "Retail Trade." Bolded codes expected to apply to most products.

## ATTACHMENT B

## UNITED STATES RESIDENT POPULATION IN THE THOUSANDS, JULY 1, 1996

United States Total = 265,284

State	Thousands	State	Thousands
Alabama	4,273	Montana	879
Alaska	607	Nebraska	1,652
Arizona	4,428	Nevada	1,603
Arkansas	2,510	New Hampshire	1,162
California	31,878	New Jersey	7,988
Colorado	3,823	New Mexico	1,714
Connecticut	3,274	New York	18,185
Delaware	725	North Carolina	7,323
District of Columbia	543	North Dakota	644
Florida	14,400	Ohio	11,173
Georgia	7,353	Oklahoma	3,301
Hawaii	1,184	Oregon	3,204
Idaho	1,189	Pennsylvania	12,056
Illinois	11,847	Rhode Island	990
Indiana	5,841	South Carolina	3,699
Iowa	2,852	South Dakota	733
Kansas	2,572	Tennessee	5,320
Kentucky	3,884	Texas	19,125
Louisiana	4,351	Utah	2,001
Maine	1,243	Vermont	589
Maryland	5,072	Virginia	6,675
Massachusetts	6,092	Washington	5,533
Michigan	9,594	West Virginia	1,826
Minnesota	4,658	Wisconsin	5,160
Mississippi	2,716	Wyoming	481
Missouri	5,359		

Source: United States Department of Commerce. Bureau of Census.



**ATTACHMENT C****CHEMICAL NAMES and CHEMICAL ABSTRACT SERVICE (CAS) NUMBERS**

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The following list of compounds and their associated CAS numbers was compiled from the U.S. EPA Survey of Consumer Products database. The U.S. EPA Survey database had a field for the *VOC's* in each product, and a field for their associated CAS numbers. These fields were compiled into a separate database, sorted, corrected, and duplicated items were removed. All synonyms (different name, same CAS number) that were not redundant were retained.

The list is by no means all inclusive, but provides a useful reference when the CAS number for a product ingredient cannot be found. We encourage individuals responding to the survey to use their products ingredient's listed CAS numbers when they are available. This is especially important when listing the hydrocarbons, because many ingredients may have the same name but different CAS numbers. For example, kerosene, mineral spirits, naphtha, petroleum distillate and others may each have several different CAS numbers, reflecting differences in product grade.

## CARB CHEMICAL NAME / CAS NUMBER LIST

Chemical Name	CAS #
(MCPD) Dimethylamine salt	32351705
1-(2-Butoxyethoxy)-2-Propanol	124163
1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxy-butane (C4F9OCH3)	163702076
1,1,1,2,3,3-Hexafluoropropane (HFC-236ea)	431630
1,1,1,2,3,4,4,5,5,5-Decafluoropentane (HFC 43-10mee)	138495428
1,1,1,2,3-Pentafluoropropane (HFC-245eb)	431312
1,1,1,2-Tetrafluoroethane (HFC-134a)	811972
1,1,1,3,3,3-Hexafluoropropane (HFC-236fa)	690391
1,1,1,3,3-Pentafluorobutane (HFC-365mfc)	406586
1,1,1,3,3-Pentafluoropropane (HFC-245fa)	460731
1,1,1-oxybisethane (See Diethyl ether)	60297
1,1,1-trichloroethane	79016
1,1,1-Trichloroethane (Methyl chloroform; 1,1,1-TCA, Aerothene TT)	71556
1,1,1-Trifluoro-2,2-dichloroethane (HCFC-123)	306832
1,1,1-Trifluoroethane (HFC-143a)	420462
1,1,2,2,3-Pentafluoropropane (HFC-245ca)	679867
1,1,2,2-Tetrachloroethylene (See Perchloroethylene)	127184
1,1,2,2-Tetrafluoroethane (HFC-134)	359353
1,1,2,3,3-Pentafluoropropane (HFC-245ea)	24270664
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	76131
1,1,2-Trichloroethylene (See Trichloroethylene, TCE)	79016
1,1,3,3-Tetramethylcyclohexane	24770647
1,1-dichloro-1-fluoroethane (HCFC-141b)	25167888
1,1-Difluoroethane (HFC-152a)	75376
1,1-Methylene-bis-4-Isocyanobenzene	101688
1,2,3-PROPANETRIOL (Glycerin)	56815
1,2,3-Trimethylbenzene	526738
1,2,4-Trimethylbenzene (pseudo-Cumene)	95636
1,2,4-Trimethylcyclohexane	2234755
1,2-Butylene Oxide (Ethyl oxirane)	106887
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC-114)	76142
1,2-Dichloro-1,1,2-trifluoroethane (HCFC-123a)	354234
1,2-Epoxy-3-butoxypropane (See Butyl glycidyl ether)	2426086
1,2-Ethenediol (See Ethylene Glycol)	107211
1,2-Propanediol (See Propylene Glycol)	57556
1,3,5-Trimethylbenzene (Mesitylene)	108678
1,3-Butylene Glycol	107880
1,3-Dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)	507551
1,3-Dimethyl-5-ethylbenzene	934747
1,4-Benzenediol (See Hydroquinone)	123319
1,4-bis-bromoacetoxy-2-butene	20679587
1,4-Butanediol diglycidyl ether (1,4-Diglycidylloxybutane)	2425798
1,4-Dichlorobenzene (p-Dichlorobenzene)	106467
1,4-Diglycidylloxybutane (See 1,4-Butanediol diglycidyl ether)	2425798
1,4-Dioxane	123911
1,6-Diisocyanohexane	822061
12-Hydroxy Octadecanoic Acid	3159624
12-Hydroxy Octadecanoic Acid Methyl Ester	141131
12-Hydroxy Octadecanoic Acid Monolithium Salt	7620771
1-Acetoxy-2-butoxyethane (2-Butoxyethyl acetate)	11272
1-Amino-2-Propanol	78966
1-Butanol (Butanol; n-Butanol; Butyl alcohol)	71363
1-Butoxy-2-propanol (See Propylene Glycol Monobutyl Ether)	5131668
1-Chloro-1,1-difluoroethane (HCFC-142b)	75683
1-Chloro-1-fluoroethane (HCFC-151a)	1615754

1-Chloro-4-trifluoromethyl benzene (See Parachlorobenzotrifluoride) (PCBTF)	98566
1-Ethoxy-1,1,2,2,3,3,4,4,4-nonfluorobutane (C4F9OC2H5)	163702054
1-Ethyl-2-methylbenzene (o-Ethyltoluene)	611143
1-Ethyl-3-methylbenzene (See 1-Methyl-3-ethylbenzene) (m-Ethyltoluene)	620144
1-Ethyl-4-methylbenzene (p-Ethyltoluene)	622968
1-Methoxy-2-Propanol (See Propylene Glycol Monomethyl Ether)	107982
1-Methoxy-2-Propanol Acetate (See Propylene Glycol Monomethyl Ether Acetate)	108656
1-Methoxy-2-Propyl acetate (See Propylene Glycol Monomethyl Ether Acetate)	108656
1-METHYL - 4 -(1-METHYLETHENYL) CYCLOHEXENE	59892725
1-Methyl-1-Phenylethyl Hydroperoxide	80159
1-Methyl-2-propylcyclohexane	4291796
1-Methyl-2-pyrrolidinone (N-Methyl-2-Pyrrolidone)	872504
1-Methyl-2-Pyrrolidone (See 1-Methyl-2-Pyrrolidinone)	872504
1-Methyl-3-ethylbenzene (m-Ethyltoluene; 1-Ethyl-3-methylbenzene)	620144
1-Methyl-4-isopropylcyclohexane (p-Menthane)	99821
1-Naphthyl-n-methylcarb-amate (See Carbaryl)	63252
1-Nitropropane	108032
1-Octadecanol	112925
1-Pentanol	71410
1-Phenyl methanol (See Benzyl Alcohol) (alpha-Hydroxytoluene)	100516
1-Propanamine, 3-(Triethoxysilyl)- (See 3-Aminopropyltriethoxysilane)	919302
1-Propanol (n-Propanol, n-Propyl alcohol)	71238
2-(2-Butoxyethoxy)ethanol (See Diethylene Glycol Monobutyl Ether)	112345
2-(2-Ethoxyethoxy) ethanol (See Diethylene Glycol Monoethyl Ether)	111900
2-(2-methyl-4-chlorophenoxy)-propionic acid	93652
2-(3H)-Furanone, Dihydro (See Butyrolactone (gamma))	96480
2-(Difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoropropane ( (CF3)2CFCF2OCH3)	163702087
2-(Ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoropropane ( (CF3)2CFCF2OC2H5)	163702065
2-(Methylethoxy)Phenol Methylcarbamate	114261
2-(Tert-butylamino)-4-Chloro-6-Ethylamino-s-triazi	5915413
2,2,4 TMO (See 2,2,4-Trimethylhexamethylenediamine)	3236531
2,2,4-Trimethyl-1,3-Monoisobutyrate (See Texanol)	25265774
2,2,4-Trimethyl-1,3-pentanediol	144194
2,2,4-Trimethyl-1,3-pentanediol di-isobutyrate (See Texanol iso-butyrate)	6846500
2,2,4-Trimethyl-1,3-pentanediol-isobutyrate (See Texanol)	25265774
2,2,4-Trimethylhexamethylenediamine (2,2,4-TMO)	3236531
2,2-dichloro-1,1-difluoroethyl methyl ether	76380
2,4 Dichlorophenoxy acetic acid dimethylamine salt (2,4-D dimethylamine salt)	2008391
2,4-D dimethylamine salt (See 2,4 Dichlorophenoxy acetic acid dimethylamine salt )	2008391
2,4-Dichlorophenoxy acetic acid (2,4-D)	94757
2,4-Diisocyanato-1-methylbenzene	584849
2,5-Pyrrolidinedione	123568
2,6-Dimethylnonane	17302282
2251 Oil (or 2263 Oil @ 64742-47-8)	64742149
2-Aminoethanol (See Ethanolamine)	141435
2-Bromo-2-chloro-1,1,1-trifluoroethane (Halothane)	151677
2-Butanol (Butyl alcohol; sec-Butanol)	78922
2-Butanone (See Methyl Ethyl Ketone, MEK)	78933
2-Butenedioic Acid	110167
2-Butoxyethanol (See Ethylene Glycol Monobutyl Ether)	111762
2-Butoxyethyl Acetate (See Ethylene Glycol Monobutyl Ether Acetate)	112072
2-Chloro-1,1,1,2-tetrafluoroethane (HCFC-124)	2837890
2-Cyano-2-Propenoic acid ethyl ester (See 2-Cyanoethyl acrylate)	7085850
2-Cyanoethyl acrylate (Ethyl cyanoacrylate)	7085850
2-Ethanolhexanol distillates	68609687
2-Ethoxyethanol (See Ethylene Glycol Monoethyl Ether)	110805
2-Ethoxyethyl Acetate (See Ethylene Glycol Monoethyl Ether Acetate)	111159
2-Ethyl Oxy-Bis-Hexanoic Acid (See Tetraethylene glycol)	18268707
2-Ethyl-3 Ethanoxypropionate (See Ethyl-3-ethoxypropionate)	763699
2-Ethylhexyl Nitrate	27248967

2-Ethylhexyl stearate	22047490
2-Heptanone	110430
2-Methoxy-1-Propanol	1589475
2-Methoxy-1-Propanol Acetate	70657704
2-Methoxyethyl Acetate (See Ethylene Glycol Monoethyl Ether Acetate)	110496
2-Methoxymethylethoxy Propanol	34590948
2-Methyl decane	6975980
2-Methyl heptane	592278
2-Methyl hexane	591764
2-Methyl nonane	871830
2-Methyl Propane (Isobutane)	75285
2-Methyl-1-Propanol (See Isobutanol)	78831
2-Methyl-2,4-Pentanediol (See Hexylene Glycol)	107415
2-METHYL-2-PROPENOIC ACID MONOESTER	27813021
2-Methyl-4-isothiazoline-3-one	2682204
2-MethylNaphthalene	91576
2-Methylpentane	107835
2-Nitropropane	79469
2-Pentanone (Methyl Propyl Ketone)	107879
2-Phenylhydrazide Acetic Acid	114830
2-Propanol (Isopropanol)	67630
2-propanol, 1-[2-(2-methoxy-1-methylethoxy)-1-m... (See Tripropylene glycol methyl ether)	20324338
2-Propanol-1-Butoxy (See Propylene Glycol Monobutyl Ether)	5131668
2-Propanone (See Acetone)	67641
2-Propenoic Acid (See Acrylic Acid)	79107
2-Propoxyethanol (Ektasolve)	2807309
3,3-Dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca)	422560
3,6-Dichloro-o-anisic acid (Benzoic acid, 3,6 dichloro-2-methoxy)	1918009
3-4 Dimethyl- 2,6 Dinitribenzenamine	40487421
3-Aminopropyltriethoxysilane (Gamma-Aminopropyltriethoxysilane)	919302
3-Ethoxy Propanoic Acid Ethyl Ester (See Ethyl-3-ethoxypropionate)	763699
3-Methyl decane	13151343
3-Methyl hexane	589344
3-METHYLMETHOXYBUTANOL	56539663
3-methylpentane	96140
4,6-Dichloro-2-trichloromethylpyridine	1129197
4-Hydroxy-4-Methyl-2-Pentanone- (See Diacetone Alcohol)	123422
4-Isopropenyl 1-Methylcyclohexane (See D-Limonene)	5989275
4-Methyl decane	2847725
4-Methyl heptane	589537
4-Methyl nonane	17301949
4-Methyl-2-Pentanol (See Methyl Amyl Alcohol)	108112
4-Methyl-2-Pentanone (See Methyl Isobutyl Ketone)	108101
5-Bromo-3-Sec-Butyl Methyluracil	314409
5-chloro-2-Methyl-4-isothiazolin-3-one	26172554
5-chloro-2-methyl-4-isothiazoline-3-one	26172554
5-Methyl decane	13151354
99.5% Monochlorotoluene (See Chlorotoluene (ortho))	95498
9-Octadecenoic Acid (Z) Ammonium Salts	544605
a,a,a-Trifluoro-s,6-dinitro-n,n-dipropyl-p-toluide (See Trifluralin)	1582098
A-70 Hydrocarbon Propellant	68476857
Acenaphthane	82329
Acetamide, N, N'-(ethenylmethyl-silylene)Bis-N-Me	50791872
Acetic Acid	64197
Acetic Acid Ethyl Ester (See Ethyl Acetate)	141786
Acetic Acid, Butyl Ester (See Butyl Acetate)	123864
Acetone (2-Propanone; Dimethyl ketone)	67641
Acetophenone	98862
Acrolein	107028
Acrylic Acid (2-Propenoic Acid)	79107

Aerothene TT (See 1,1,1-Trichloroethane)	71556
Alcohol Ethoxylate	68439509
ALIPHATIC DISTILLATE	64741737
Aliphatic Hydrocarbon	64742967
Aliphatic Hydrocarbon	64771728
ALIPHATIC HYDROCARBON	64741657
ALIPHATIC HYDROCARBON	64742898
Aliphatic Hydrocarbon (Stoddard Type) (See Stoddard solvent)	8052413
Aliphatic Petroleum Distillate	64742887
Aliphatic Petroleum Distillate	64742967
Aliphatic petroleum distillates	64741657
Aliphatic petroleum distillates	68334305
Aliphatic petroleum distillates, kerosene (See Kerosene)	8008206
Aliphatic Petroleum Hydrocarbon	64741442
Alkali Surfactant	61790123
Alkali Surfactant NM	64972196
Alkyl Acetate	90438792
Alkyl Dimethyl Benzyl Ammonium Chloride	68391015
Alkyl Dimethyl Benzyl Ammonium Chloride	68391015
Alkyl Dimethyl Ethyl Benzyl Ammonium Chloride	68956790
Alkyl dimethylbenzylammonium chloride	68391015
Alkyl dimethylbenzylammonium chloride	68391015
Alkyl Glycidyl Ether	68609972
Alkyl Olefin Sulfonate	68439576
Alkyl Olefin Sulfonate	68439576
Alkyl Olefin Sulfonate, Sodium Salt	68439576
Alkylaryl Sulfonate	26264051
Alkylaryl Sulfonate Isopropylamine Salt	26264051
Alkylation Naphtha, heavy	64741657
Alkylphenol Ethanol (See Nonylphenol, ethoxylated)	9016459
Alkylphenol Ethoxylate (See Nonylphenol, ethoxylated)	9016459
Alpha terpineol (Terpineol (alpha))	98555
alpha-Hydroxtoluene (See Benzyl Alcohol)	100516
Amino Methyl Propanediol	115695
Aminomethyl Propanol	124685
Ammonium Lactate (Propanoic acid, 2-hydroxy-monoammonium salt)	515980
Ammonium Lauryl Sulfate	2235543
Ammonium Thioglycolate (Thioglycolate, ammonium salt)	5421465
Amyl Acetate	628637
Arcosolv pm (See Propylene Glycol Monomethyl Ether)	107982
Armak 1194	61791262
Aromatic 150	25551137
Aromatic 200 Solvent	68477316
Aromatic Hydrocarbon Solvent	64741680
Aromatic Petroleum Distillate	64741986
Aromatic Petroleum Distillates	64742907
AROMATIC SOLVENT	68477316
Aromatic solvent, heavy aromatic naphtha	64742945
Asphalt	8052424
Atrazine - Tech	1912249
ATROSOL 504 (See citrus acid?)	77929
Bardac 208M Lonza	68424955
Bardac MB-50]	139082
Barrium Sulfinat	61790485
Base Oil	8030309
Benefin	1861401
Benomyl	17804352
Bensulide	741562
Benzaldehyde	100527
Benzalkonium chloride	8001545

Benzocaine (Ethyl p-aminobenzoate)	94097
Benzoic acid, 3,6 dichloro-2-methoxy (See 3,6-Dichloro-o-anisic acid)	1918009
Benzotriazole	95147
Benzyl Acetate	140114
Benzyl Alcohol (1-Phenyl methanol; alpha-Hydroxytoluene)	100516
benzyl ammonium chloride	68424851
Benzylkonium Chloride (w/ 20% ethanol)	68424851
Betaine	64789400
Betaine	61789400
Bismuth Octoate	67874719
Boiled Linseed Oil (See Linseed Oil)	8001261
BTC-2125M 80% Stephan Company	68391015
BTC-8249 Stephan Company	68391015
Butane (n)	106978
Butane, branched and linear	68513655
Butanediol diglycidyl ether (See 1,4-Butanediol diglycidyl ether)	2425798
Butanol (See 2-Butanol)	78922
Butoxyethanol (See Ethylene Glycol Monobutyl Ether)	111762
ButoxyPropanol	57018527
Buturol (See 1-Butanol) (Butyl alcohol)	71363
Butyl acetate	540885
Butyl Acetate (n-Butyl Acetate)	123864
Butyl Alcohol (See 2-Butanol)	78922
Butyl Carbitol (See Diethylene Glycol Monobutyl Ether)	112345
Butyl Cellosolve (See Ethylene Glycol Monobutyl Ether)	111762
Butyl Cellosolve Acetate (See Ethylene Glycol Monobutyl Ether Acetate)	112072
Butyl glycidyl ether (1,2-Epoxy-3-butoxypropane)	2426086
Butylene Glycol (See 1,3-Butylene Glycol)	107880
Butyrolactone (gamma)	96480
C10-15 Saturated Hydrocarbon	64742478
C10-C11 PARAFFINS CYCLO-PARAFFINS	64741657
C11-12 Isoparaffin	68551177
C11-13 ISOPARAFFIN	64742489
C11-13 Isoparaffin Solvent	68551177
C12 Alpha Olefin	25378227
C12-C15 Ethoxylated Alcohol	68131395
C3-C4 Alkane Propellant	68475592
C3-C4 Propellant	68475592
C4F9OC2H5 (1-Ethoxy-1,1,2,2,3,3,4,4,4-nonafluorobutane)	163702054
C4F9OCH3 (1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxy-butane)	163702076
c6-oxo Alcohol Acetate	88230357
C-8/C-10 Alcohol	68603156
C9-11 ISOPARAFFIN	68551166
C9-C12 Alkylbenzenes	68515253
C9-C12 Saturated Hydrocarbons	64741657
Camphor	76222
Camphor	464493
Camphor	21368683
Camphor oil	8008513
Camphor yellow (See Camphor oil)	8008513
Caprolactam (2H-Azepin-2-one, hexahydro)	105602
Captan	133062
Captan, Technical (See Captan)	133062
Carbamide	57136
Carbaryl	63252
Carbital DE (See Diethylene Glycol Monoethyl Ether)	111900
Carbitol (See Diethylene Glycol Monoethyl Ether)	111900
Carbon Dioxide	124389
Carbon tetrachloride	56235
Carsamide CA	61789193

Castor Oil	8001794
Cellosolve (See Ethylene Glycol Monoethyl Ether) (EGEE)	110805
Cellosolve Acetate (See Ethylene Glycol Monoethyl Ether Acetate)	111159
Cellosolve Solvent (See Ethylene Glycol Monoethyl Ether)	110805
CFC-11 (See Trichlorofluoromethane)	75694
CFC-113 (See 1,1,2-Trichloro-1,2,2-trifluoroethane)	76131
CFC-114 (See 1,2-Dichloro-1,1,2,2-tetrafluoroethane)	76142
CFC-115 (See Chloropentafluoroethane)	76153
CFC-12 (See Dichlorodifluoromethane)	75434
Chlorobenzene (Monochlorobenzene)	108907
Chlorodifluoromethane (HCFC-22)	75456
Chlorofluoromethane (HCFC-31)	593704
Chloroform	67663
Chloropentafluoroethane (CFC-115)	76153
Chloropicrin (Trichloronitromethane)	76062
Chlorotoluene (Monochlorotoluene)	25168052
Chlorotoluene (ortho)	95498
Chlorpyrifos	291882
Chlorpyrifos (Dursban)	2921882
Chlorpyrifos-methyl	5598130
Cis-1,3-Dichloropropene	10061015
cis-1,3-Dimethylcyclohexane	63840
cis-Decalin	49316
Citrus Distillate (See Citrus Terpene)	65995987
Citrus Terpene	65995987
Clopyralid Monoethanolamine salt	57754855
Clove Oil	8000348
Cocamidopropyl Amino Betane	61789400
Coco Diethanolamide	67785131
Coco Diethanolamide	67785131
Coco Diethanolamide-sulfonate	67785119
Cocoamidopropyl Amine Oxide 35%	68155099
Cocoamidopropyl Betaine	70851079
Coconut Diethanolamine	68603429
COCONUT DIETHANOLAMINE	68603429
Copper Naphthenate	1338029
Corvus Oil 00519-13	64742558
Cottonseed Oil (Gossypium Hirsutum)	8001294
Cresol (Cresylic acid; Cresols, mixed)	1319773
Cresol (meta)	108394
Cresol 174 (See Cresol)	1319773
Cresols, mixed (See Cresol)	1319773
Cresylic acid (See Cresol)	1319773
Crude Citrus Limonene (See D-Limonene)	5989275
Cyclohexane	110827
Cyclohexanol	108930
Cyclohexanone	108941
Cyclomethicone (DC 244)	69430246
Cyclomethicone (DC245/345)	69430246
CYCLOMETHICONE TETRAMER	69430246
Cythion Insecticide Concentrate (See Malathion)	121755
Damar gum	9000162
DDVP	620737
Decahydronaphthalene (See Decalin)	91178
Decalin (Decahydronaphthalene)	91178
Decamethylcyclopentasiloxane	541026
DEET (See N,N-Diethyl-M-Toluamide)	134623
DEG Methyl Ether (See Diethylene Glycol Monomethyl Ether)	111773
Deodorized Kerosene	64742967
Deodorized Kerosene (See Kerosene)	8008206

DETA. (See Diethylenetriamine)	111400
Dexpanthenol	81130
Di(2-Ethylhexyl Phthalate)	117817
Di[2-ethylhexanoate] (See Tetraethylene glycol)	18268707
Diacetone Alcohol (4-Hydroxy-4-Methyl-2-Pentanone)	123422
Dialkyl methyl benzylammonium chloride	73049759
Diazinon	333415
Diazinon MG-8 (See Diazinon)	333415
Dibutyl Phthalate	84742
Dicetyl Diammonium	1812539
Dichlorobenzene (ortho)	95501
Dichlorodifluoromethane	75718
Dichlorodifluoromethane (CFC-12)	75434
Dichloromethane (See Methylene chloride)	75092
Dichlorvos	62737
Diecyl Dimethyl Ammonium Chloride	7173515
Diesel Fuel	68476346
Diesel Fuel #2	64742442
Diesel Fuel #2	68476346
Diethanolamine	111422
Diethyl Ether	60297
Diethylamine Salt of 2,4-dichlorophenoxy acetic acid (See 2,4 Dichlorophenoxy acetic acid dimethylamine salt )	2008391
Diethylamine salt of 2,4-Dichlorophenoxyacetic acid (See 2,4-Dichlorophenoxyacetic acid)	94757
Diethylaminoethanol	100378
Diethylene Glycol	111466
Diethylene glycol butyl ether	112345
Diethylene Glycol Butyl Ethers	111981
Diethylene Glycol Diethyl Ether (DEGDDE)	112367
Diethylene Glycol Dimethyl Ether (DEGDME)	111966
Diethylene Glycol Ethyl Ether (See Diethylene Glycol Monoethyl Ether)	111900
Diethylene glycol methyl ether (See Diethylene Glycol Monomethyl Ether)	111773
DIETHYLENE GLYCOL METHYL ETHERS	89399280
Diethylene Glycol Monobutyl Ether (DEGBE) (Butyl Carbitol) (2-(2-Butoxyethoxy)ethanol)	112345
Diethylene Glycol Monoethyl Ether (DEGEE) (Carbitol) (2-(2-Ethoxyethoxy)ethanol)	111900
Diethylene Glycol Monomethyl Ether (DEGME) (Methyl Carbitol) (2-(2-Methoxyethoxy)ethanol)	111773
Diethylene Glycol N-Butyl Ether (See Diethylene Glycol Monobutyl Ether)	112345
Diethylene Glycol Phenyl Ether	104687
Diethylenetriamine (DETA)	111400
Difluoroethane (See 1,1-Difluoroethane) (HFC-152a)	75376
Difluoromethane (HFC-32)	75105
Diglycolamine	929066
Dihydroxy Acetone	96264
Diisobutyl Ketone	108838
Di-iso-propyl adipate (Hexanedioic acid, bis (1-methylhexyl))	6938949
Dimethicone Copolyol	64365237
Dimethoate	60515
Dimethyl Adipate (hexanedioic acid, methyl ester)	627930
Dimethyl benzene (See Xylene)	1330207
Dimethyl Carbinol (See 2-Propanol) (Isopropanol)	67630
Dimethyl Ether (DME)	115106
Dimethyl formamide (N,N-Dimethylformamide)	68122
Dimethyl Glutarate	11119400
Dimethyl glutarate (Glutaric acid dimethyl ester; Dimethylpentanedioate)	1119400
Dimethyl Ketone (See Acetone)	67641
Dimethyl phenol phosphate	25155231
DIMETHYL SILOXANE	63148629
Dimethyl Succinate (Butanedioic acid, dimethyl ester?)	106650
Dimethyl Sulfoxide	67685
Dimethylamine	124403
Dimethylamine Salt of 2,4-Dichlorophenoxyacetic Acid (See 2,4-Dichlorophenoxyacetic acid)	94757

Dimethylamine Salt of Dicamba (See 3,6-Dichloro-o-anisic acid)	1918009
Dimethylamine Salt of MCPP (See 2-(2-methyl-4-chlorophenoxy)-propionic acid)	93652
Dimethylamino Propylamine	109557
Dimethylethanolamine	108010
Dimethylpentanedioate (See Dimethyl glutarate)	1119400
Dimethylpolysiloxane	63148629
Diethyl Phthalate	117840
Diethyl sebacate (Decanedioic acid, bis 2-ethyl hexyl ester)	122623
Dipentene (p-Mentha-1,8-Diene)	138863
Dipropylene glycol	25265718
Dipropylene Glycol Methyl Ether	34590948
Dipropylene Triamine	56188
Disodium Cocamide Mipa Sulfosuccinate	68515651
Disodium ethylene bisdithiocarbamate (See Ethylene (bis) dithiocarbamate, disodium salt)	142596
Disodium Laureth Sulfosuccinate	39354455
Distillates (Petroleum), Solvent-Rf Lt.Nap	64741895
d-Limonene	68647723
D-Limonene	68917577
D-Limonene (D-1-Methyl-4-iso-propenylcyclohexene)	5989275
DL-Limonene	7705148
DME (See Dimethyl Ether)	115106
Dodecane	112403
Dodecyl Benzene Sulfonic Acid	27176870
Dodecylbenzene Sulfonate	27176870
Dodecylbenzene Sulfonic Acid	27176870
Dodecylbenzenesulfonate (See Sodium Dodecylbenzene sulfonate)	25155300
Dow Corning 344	69430246
DOWANOL DPM	34590948
Dowanol PM Acetate (See Propylene Glycol Monomethyl Ether Acetate)	108656
Dowanol PM Glycol Ether (See Propylene Glycol Monomethyl Ether)	107982
D-Tert Butyl Phenyl Glycidyl Ether	3101608
Dursban (See Chlorpyrifos)	2921882
Dursban H.F. Insecticide Concentrate (See Chlorpyrifos)	2921882
Dymel A (See Dimethyl Ether)	115106
EEP Solvent (See Ethyl-3-ethoxypropionate)	763699
Ektasolve (See Ethylene Glycol Monopropyl Ether)	2807309
Ektasolve EP (See Ethylene Glycol Monopropyl Ether)	2807309
Emcol 14	71012107
Epoxidized Soybean Oil (See Soya bean oil)	8013078
Epoxy Resin	28064144
Ethalfuralin	55283686
Ethane	74840
Ethanol (Ethyl alcohol; SD-Alcohol; SDA-38B or SDA-40)	64175
Ethanol (Methanol Denatured)	8013523
Ethanol SDA 39C	8024451
Ethanol, 2-butoxy (See Ethylene Glycol Monobutyl Ether)	111762
Ethanolamine (2-Aminoethanol)	141435
Ethanolamine Sulfite	15535292
Ethoxy Sulfate, Neodol 25-3S	68586342
Ethoxydiglycol (See Diethylene Glycol Monoethyl Ether)	111900
Ethoxyethanol (See Ethylene Glycol Monoethyl Ether)	110805
Ethoxylated Alcohol C12-15	68131395
Ethoxylated Alcohol C12-16	68551122
Ethyl 3-ethoxypropionate	7636699
Ethyl Acetate	141786
Ethyl Alcohol	97702170
Ethyl alcohol (See Ethanol)	64175
Ethyl Benzene	100414
Ethyl cyanoacrylate (See 2-Cyanoethyl acrylate)	7085850
Ethyl Ester of PVM/MA Copolymer (w/ethanol)	25087063

Ethyl Ether (See Diethyl ether)	60297
Ethyl-3-ethoxypropionate (EEP)	763699
Ethylbenzene	110414
Ethylene	74851
Ethylene (bis) dithiocarbamate, disodium salt	142596
Ethylene Diamine	107153
Ethylene Diamine Tetra Acetate	60004
Ethylene Dichloride	107062
Ethylene Glycol (1,2-Ethanediol)	107211
Ethylene Glycol Diethyl Ether	629141
Ethylene Glycol Dimethyl Ether	110714
Ethylene Glycol Methyl Ether (See Ethylene Glycol Monomethyl Ether)	109864
Ethylene Glycol Monobutyl Ether (EGBE) (Butyl Cellosolve) (2-Butoxyethanol)	111762
Ethylene Glycol Monobutyl Ether Acetate (EGBEA) (Butyl Cellosolve Acetate) (2-Butoxyethyl Acetate)	112072
Ethylene Glycol Monoethyl Ether (EGEE) (Cellosolve) (2-Ethoxyethanol)	110805
Ethylene Glycol Monoethyl Ether Acetate (EGEEA) (Cellosolve Acetate) (2-Ethoxyethyl Acetate)	111159
Ethylene Glycol Monomethyl Ether (EGME) (Methyl Cellosolve) (2-Methoxyethanol)	109864
Ethylene Glycol Monomethyl Ether Acetate (EGMEA) (Methyl Cellosolve Acetate)	110496
Ethylene Glycol Monophenyl Ether	122996
Ethylene Glycol Monopropyl Ether (Ektasolve; Ethylene glycol-n-propyl ether)	2807309
Ethylene Glycol N-Butyl Ether (See Ethylene Glycol Monobutyl Ether)	111762
Ethylene Glycol Phenyl Ether (See Ethylene Glycol Monophenyl Ether)	122996
Ethylene glycol-n-propyl ether (See Ethylene Glycol Monopropyl Ether)	2807309
Ethylene Oxide (Oxirane)	75218
Ethylene/vinyl acetate polymer	24937788
Ethylfluoride (HFC-161)	353366
Ethyltoluenes	25550145
Eucalyptus Oil	8000484
Eugenol	97530
Fatty Diethanolamide	68604353
Ferbam	14484641
Formaldehyde	50000
Formalin (See Formaldehyde)	50000
Formic acid (Methanoic acid)	64186
FREON 22 SOLVENT (See Chlorodifluoromethane)	75456
FREON TF (See 1,1,2-Trichloro-1,2,2-trifluoroethane)	76131
fuel-oil no. 2	68476302
Furfuryl Alcohol	98000
Gamma-Aminopropyltriethoxysilane (See 3-Aminopropyltriethoxysilane)	919302
gamma-Butyrolactone (See gamma-Butyrolactone)	96480
Gantrez ES224	25087063
Gantrez ES225	25087063
Glutaraldehyde (Pentanedial)	111308
Glutaric acid dimethyl ester (See Dimethyl glutarate)	1119400
Glycereth-7	31694550
Glycerin (See 1,2,3-Propanetriol)	56815
Glyceryl Thioglycolate	30618849
Glycol Ether - Butyl Carbitol (See Diethylene Glycol Monobutyl Ether)	112345
Glycol Ether Acetate (See Ethylene Glycol Monomethyl Ether Acetate)	110496
Glycol Ether DB (See Diethylene Glycol Monobutyl Ether)	112345
Glycol Ether De-Low Grav. (See Diethylene Glycol Monoethyl Ether)	111900
Glycol Ether DM (See Diethylene Glycol Monomethyl Ether)	111773
Glycol Ether DPM	34590948
Glycol Ether DR-Lo Grav. (See Diethylene Glycol Monoethyl Ether)	111900
Glycol Ether EB (See Ethylene Glycol Monobutyl Ether)	111762
Glycol Ether EE (See Ethylene Glycol Monoethyl Ether)	110805
Glycol Ether EP (See Ethylene Glycol Monopropyl Ether)	2807309
Glycol Ether EPH (See Ethylene Glycol Monophenyl Ether)	122996
Glycol Ether PM (See Propylene Glycol Monomethyl Ether)	107982
Glycol Methylene Ether (1,3-Dioxolane?)	646060

Glycolic Acid (See Hydroxyacetic Acid)	79141
Gum Turpentine	9005907
Halothane (See 2-Bromo-2-chloro-1,1,1-trifluoroethane)	151677
Halso AG125 Monochlorotoluene (See Chlorotoluene)	25168052
Hamposyl L-30 (See Hydrocarbon Detergent)	137166
Han Solvent	64742069
HAN-857	64742069
HCFC-123 (See 1,1,1-Trifluoro-2,2-dichloroethane)	306832
HCFC-123a (See 1,2-Dichloro-1,1,2-trifluoroethane)	354234
HCFC-124 (See 2-Chloro-1,1,1,2-tetrafluoroethane)	2837890
HCFC-141b (1,1-Dichloro-1-fluoroethane)	25167888
HCFC-142b (See 1-Chloro-1,1-difluoroethane)	75683
HCFC-151a (See 1-Chloro-1-fluoroethane)	1615754
HCFC-22 (See Chlorodifluoromethane)	75456
HCFC-225ca (See 3,3-Dichloro-1,1,1,2,2-pentafluoropropane)	422560
HCFC-225cb (See 1,3-Dichloro-1,1,2,2,3-pentafluoropropane)	507551
HCFC-31 (See Chlorofluoromethane)	593704
Heavy Alkylate Naphtha	64741657
Heavy Aromatic Naphtha Solvent (See Aromatic solvent, heavy aromatic naphtha)	64742945
Heptane (See n-Heptane)	142825
Hexachlorocyclohexane - gamma (Lindane)	58899
Hexamethylenediamine	6898775
Hexane (See n-Hexane)	110543
Hexanedioic acid, bis (1-methylhexyl) (See Di-iso-propyl adipate)	6938949
Hexone (See Methyl Isobutyl Ketone)	108101
Hexylene Glycol (2-Methyl-2,4-pentane diol)	107415
HFC 43-10mee (1,1,1,2,3,4,4,5,5,5-Decafluoropentane)	138495428
HFC-125 (See Pentafluoroethane)	354336
HFC-134 (See 1,1,2,2-Tetrafluoroethane)	359353
HFC-134a (See 1,1,1,2-Tetrafluoroethane)	811972
HFC-143a (See 1,1,1-Trifluoroethane)	420462
HFC-152a (See 1,1-Difluoroethane)	75376
HFC-161 (See Ethylfluoride)	353366
HFC-23 (See Trifluoromethane)	75467
HFC-236ea (See 1,1,1,2,3,3-Hexafluoropropane)	431630
HFC-236fa (See 1,1,1,3,3,3-Hexafluoropropane)	690391
HFC-245ca (See 1,1,2,2,3-Pentafluoropropane)	679867
HFC-245ea (See 1,1,2,3,3-Pentafluoropropane)	24270664
HFC-245eb (See 1,1,1,2,3-Pentafluoropropane)	431312
HFC-245fa (See 1,1,1,3,3-Pentafluoropropane)	460731
HFC-32 (See Difluoromethane)	75105
HFC-365mfc (See 1,1,1,3,3-Pentafluorobutane)	406586
High Flash Naptha	68476799
Hydrocarbon Detergent	137166
HYDROCARBON PROPELLANT	68476868
Hydrocarbon Propellant A-17 (See Butane (n))	106978
Hydrocarbon resin	68003510
HYDROCARBONS	64741737
Hydroquinone (1,4-Benzenediol)	123319
HYDROTREATED HEAVY NAPHTHA (PETROLEUM)	64742489
hydrotreated light distillate	64742149
Hydrotreated Light Distillate	64742478
Hydrotreated middle distillate	64742467
hydroxy alkylmethacrylate	27813021
Hydroxyacetic Acid (Glycolic Acid)	79141
Hydroxyethyl methacrylate	868779
Imazaquin	81335479
Indan	496117
Intrasol FA 12/18/5	22047490
Iodine	7553562

Isobornyl Acetate (Bicyclo[2.2.1]heptan-2-ol, 1,7,7-trimethyl,-acetate)	125122
Isobutane (See 2-Methyl propane) (A-31)	75285
ISOBUTANE/ PROPANE	68476857
isobutane/propane	68475592
Isobutane/Propane	68476868
Isobutanol (2-Methyl-1-Propanol)	78831
Isobutyl Acetate	110190
Isobutyl Acetone (See Isobutyl Acetate)	110190
Isobutyl Isobutyrate	97858
Isobutyl methacrylate	97869
Isobutylcyclohexane	1678984
Isohexadecane	15220856
Isohexane	73513425
Isohexane (See 2-Methylpentane)	107835
Isomeric Hydrocarbons	68551188
Isopar C	64742489
Isopar E	64742489
Isopar G	64742489
Isopar H	64742489
Isopar K	64742489
Isopar L	64742489
Isopar M	64742478
ISOPARAFFIN HYDROCARBON	64741657
ISOPARAFFINIC PETROLEUM	68551199
Isoparaffinic petroleum solvent	8001603
ISOPARAFFINIC SOLVENT	64742489
Isophorone	78591
Isophorone Diamine	2855132
Isophorone diisocyanate	4098719
Isopropanol (See 2-Propanol) (Isopropyl alcohol; IPA; 2-Propanol)	67630
Isopropyl Acetate	108214
Isopropyl Alcohol	26080191
Isopropyl Isosterate	68171335
Isopropylamine	75310
Isopropylcyclohexane	696297
Kaydol Mineral Oil (See Paraffin oil)	8012951
KD-COCO AMIDE	61791319
Kerosene	8008206
Kerosene	9002059
Kerosene	64742810
KEROSENE	64742478
Klearol Mineral Oil (See Paraffin oil)	8012951
L.P. Gas Propellant	68476868
Lactic Acid	50215
Lactol Spirits	64741555
Lavender Oil	8000280
Lead Chromate (C.I. pigment yellow 34)	1344372
Lemon Oil	68916892
LIGHT ALIPHATIC NAPHTHA SOLVENT	64742898
LIGHT AROMATIC NAPHTHA SOLVENT	64742956
Light Distillate	64742149
Light naphtha	64742840
Light Naphtha	64742149
light petroleum distillate	64742749
Ligroine (See Petroleum ether, ligroin)	8032324
Lindane (See Hexachlorocyclohexane - gamma)	58899
LINEAR ALCOHOL ETHOXYLATE	69013189
LINSEED OIL	68001261
Linseed Oil	8001261
Liquid Petroleum Propellant	68476889

Liquified Petroleum Gas	68476857
LPA Petroleum Distillate	68551188
Lubricating Oil	64742525
Malathion	121755
Malathion - Technical (See Malathion)	121755
Malathion TE (See Malathion)	121755
Malic acid (Hydroxysuccinic acid)	6915157
Manalox Resin	13419153
M-Cresol (See Cresol (meta))	108394
Medium Aliphatic Solvent Naphtha	64742887
MEK (See Methyl Ethyl Ketone; 2-Butanone)	78933
Menthol	89781
Menthol	15356704
Mesityl Oxide (3-penten-2-one, 4-methyl)	141797
Meta Cresol 36/38 (See Cresol (meta))	108394
Methacrylic Acid	31346573
Methacrylic Acid (2-methyl-2-propenoic acid)	79414
Methane	74828
Methanoic acid (See Formic acid)	64186
Methanol (Methyl alcohol)	67561
Methoxychlor	72435
Methoxymethyl Ethoxypropanol	34590948
Methoxypropanol (See Propylene Glycol Monomethyl Ether)	107982
Methyl Alcohol (See Methanol)	67561
Methyl Amyl Alcohol (4-Methyl-2-Pentanol)	108112
Methyl Amyl Ketone (Methyl n-Amyl Ketone) (MAK)	110430
Methyl Benzene	108883
Methyl Benzoate	93583
Methyl Bis Hydroxyethyl Ammonium Methylsulfate	68410695
Methyl Carbitol (See Diethylene Glycol Monomethyl Ether)	111773
Methyl Cellosolve (See Ethylene Glycol Monomethyl Ether)	109864
Methyl Cellosolve Acetate (See Ethylene Glycol Monomethyl Ether Acetate) (EGMEA)	110496
Methyl chloroform (See 1,1,1-Trichloroethane)	71556
Methyl Cyanoacrylate	137053
Methyl Dihydroxyethylisotridecyloxypropyl Ammonium	68610195
Methyl Ether (See Dimethyl Ether)	115106
Methyl Ethyl Ketone (MEK; 2-Butanone)	78933
Methyl Isoamyl Ketone	110123
Methyl Isobutyl Ketone (MIBK) (4-Methyl-2-Pentanone) (Hexone)	108101
Methyl isopropyl ketone	563804
Methyl methacrylate	80626
Methyl n-amyl Ketone (See Methyl Amyl Ketone)	110430
METHYL NAPHTHALENE	65996794
Methyl Nonyl Ketone	112129
Methyl n-Propyl Ketone (See 2-Pentanone)	107879
Methyl propyl ketone (See 2-Pentanone)	107879
METHYL SALICYLATE (Benzoic acid, 2-hydroxy, -methyl ester)	119368
Methyl Tertiary Butyl Ether (MTBE)	1634044
METHYLAL, DIMETHOXYMETHANE	109875
Methylcyclohexane	108872
Methylcyclopentadienyl Manganese Tricarbonyl	12108133
Methylene Bis (4-Cyclohexylisocyanate)	512431
Methylene bis(4-cyclohexylisocyanate)	5124301
Methylene bis(thiocyanate)	6317186
Methylene chloride (Dichloromethane)	75092
Methoxy Propanol Acetate (See Propylene Glycol Monomethyl Ether Acetate)	108656
MIBK (See Methyl Isobutyl Ketone)	108101
MIDDLE DISTILLATE PETROLEUM SOLVENT EXTRACT	64742069
MINERAL OIL	64742525
Mineral Oil	64742650

Mineral Oil	64741964
Mineral oil, white (Carnea oil)	8020835
Mineral oil, white (Slab Oil)	8042475
Mineral Seal Oil	64742809
MINERAL SEAL OIL	64741657
Mineral Seal Oil	64741442
Mineral Seal Oil	64742467
Mineral Seal Oil	64742309
Mineral spirits	64742887
Mineral spirits	68513031
Mineral Spirits	64475850
Mineral Spirits	64741324
Mineral Spirits	64741419
Mineral Spirits	64741657
Mineral Spirits	64742428
Mineral Spirits	64742478
Mineral Spirits	64742442
MINERAL SPIRITS (MINERAL SEAL OIL)	64741442
Mixed 2,2,4 and 2,4,4 trimethyl	25513648
Mixed 2,2,4 and 2,4,4 trimethyl-1,6	25513648
Modified Polyethoxylated Alcohol	70321561
Molybdate Orange	12656858
Monochlorobenzene (See Chlorobenzene)	108907
Monochlorotoluene (See Chlorotoluene)	25168052
mono-Chlorotoluene (See Chlorotoluene)	25168052
Monoethanolamine (See Ethanolamine)	141435
Monosodium Acid Methanearsonate (MSMA)	2163806
Morpholine	110918
Morpholine	68855547
M-Pyrol (Methyl pyrrolidine)	120945
m-Pyrol (See 1-Methyl-2-Pyrrolidinone)	872504
MSMA (See Monosodium Acid Methanearsonate)	2163806
MTBE (See Methyl Tertiary Butyl Ether)	1634044
N-(1-Ethylpropyl -3,4-Dimethyl 2,6-Dinitrobenzenam	40487421
N,N-Diethyl-M-Toluamide (DEET)	134623
N,N-Dimethylformamide (See Dimethyl formamide)	68122
N,N-Dimethyl-p-Toluidine	99978
NABAM (See Ethylene (bis) dithiocarbamate, disodium salt)	142596
N-Alkyl Dimethyl Benzyl Ammonium Chloride	68424851
N-Alkyl Dimethyl Benzyl Ammonium Chloride (See Benzalkonium chloride)	8001545
n-Amyl acetate (See Amyl acetate)	628637
Naphtha (Petroleum Naphtha)	8030306
Naphtha Heavy Alkylate	64741657
Naphtha, Heavy Aromatic	64742069
NAPHTHA, STRAIGHT RUN, HEAVY	64741419
Naphthalene	91203
Naphthenic Acid Lead Salt	61790145
Naphthol Spirits	64792489
Naptherie Distillate	64742525
N-Butane (See Butane (n))	106978
n-Butoxypropanol (See Propylene Glycol Monobutyl Ether)	5131668
n-Butyl Acetate (See Butyl Acetate)	123864
n-Butyl Ether of Ethylene Glycol (See Ethylene Glycol Monobutyl Ether)	111762
n-Butyl Propionate	590012
Neopentyl Glycol (2,2-Dimethyl-1,3-Propanediol)	126307
Neutral Base Oil	64741895
n-Heptane	142825
n-Hexane	110543
Niacinamide (3-pyridine carboxamide)	98920
Nitrapyrin (Pyridine, 2-chloro-6-trichloro methyl?)	1929824

Nitrocellulose	9004700
NITROETHANE	79243
Nitroglycerin (1,2,3-propanetriol, trinitrate)	55630
Nitromethane	75525
N-Methyl-2-Pyrrolidone (See 1-Methyl-2-Pyrrolidinone)	872504
N-Methylpyrrolidone (See 1-Methyl-2-Pyrrolidinone)	872504
N-Methylpyrrolidone	120945
n-Octane	111659
Nonane	111842
Nonyl Phenyl Ethylene Oxide 6M	68412544
Nonylphenol Polyethoxylate (See Nonylphenol, ethoxylated)	9016459
Nonylphenol, ethoxylated (Nonylphenoxypolyethoxy ethanol; Polyoxyethylene nonylphenyl ether)	9016459
Norpar 15	64771728
N-pentane	109660
N-Phosphonomethylglycine	1071836
n-Propanol (See 1-Propanol) (n-Propyl alcohol)	71238
n-Propoxypropanol	1569013
n-Propyl Acetate	109604
n-Propylbenzene	103651
N-vinyl-2-pyrrolidone	88120
O,O-dimethyl-O-phosphorothiate	333476
o-Benzyl-p-Chlorophenol	120321
o-Chlorotoluene (See Chlorotoluene (o))	95498
o-cresyl glycidyl ether	26447143
Octane (See n-Octane)	111659
Octanol	111875
Octyl dimethyl amine oxide	2605789
Octyl Epoxy Tallate	61788725
Octylphenol Ether (See Octylphenoxypolyethoxy ethanol)	9036195
Octylphenoxypolyethoxy ethanol (Triton X-114; Polyoxyethylene octylphenyl ether)	9036195
Octylphenyl ethylene oxide	9002931
o-Dichlorobenzene (See Dichlorobenzene (ortho))	95501
Odorless Mineral Spirits	64741418
Odorless Mineral Spirits	64741657
ODORLESS MINERAL SPIRITS	64475850
Odorless Mineral Spirts	64741657
ODORLESS MINIERAL SPIRITS -	64742150
Oil Camphor (See Camphor oil)	8008513
Oil of Pine Tar (See Pine tar)	8011481
Oil Petitgrain (See Petitgrain oil)	8014173
Oil Spike (See Spike Lavender Oil)	8016782
Oleic Acid (9-octadecenoic acid)	112801
Oleyl Alcohol	143282
O-Nitrotoluene	88722
Orange Oil	68606940
Orange Oil	8008579
Orange Oil Terpenes	68647723
Orange Oil Terpenes	68917577
Orange Terpene	65996987
Orange Terpene	68647723
Orchex 796	72623848
ORTHODICHLOROBENZENE	25321226
ortho-Phenylphenol	90437
Oxo-Heptyl Acetate	90438792
o-Xylene (See Xylene (ortho))	95476
Pale Oil	68476302
Pale Oil (See Petroleum Oil)	8002059
Panasol AN2K	63798787
Parachlorobenzotrifluoride (PCBTF) (1-Chloro-4-trifluoromethyl benzene)	98566
Parachlorometoxlyenol	88040

Para-dichlorobenzene (See 1,4-Dichlorobenzene)	106467
Paraffin oil	8012951
Paraffin Wax	8002742
Paraffinic Distillate	64742650
PARAFFINIC PETROLEUM SOLVENT	64741895
Parafin series of hydrocarbon solvents	68466868
Paraformaldehyde	30525894
PCBTF (See Parachlorobenzotrifluoride) (1-Chloro-4-trifluoromethyl benzene)	98566
p-Dichlorobenzene (See 1,4-Dichlorobenzene)	106467
Pentachloronitrobenzene	826886
Pentaethylene glycol	4792158
Pentafluoroethane (HFC-125)	354336
Pentane (See n-Pentane)	109660
PERACETIC ACID	79210
Perchloroethylene (1,1,2,2-Tetrachloroethylene)	127184
Permethrin (80 % concentrate)	52645531
Petitgrain oil	8014173
Petrolatum	8009038
Petroleum (Petroleum Oil)	8002059
Petroleum Distillate	64741908
Petroleum Distillate	64742376
Petroleum Distillate	68476302
Petroleum Distillate	68551155
PETROLEUM DISTILLATE	64741771
PETROLEUM DISTILLATE	64741964
Petroleum Distillate	64741442
Petroleum Distillate	64741862
Petroleum Distillate (Deodorized Kerosene)	64742149
Petroleum Distillate, Naphtha (See Naphtha)	8030306
Petroleum distillates	64742898
PETROLEUM DISTILLATES	64741964
Petroleum Distillates	64742309
Petroleum ether, ligroin	8032324
Petroleum hydrocarbon	64742467
Petroleum Hydrocarbon Distillate	64741964
PETROLEUM HYDROCARBON NAPHTHA	64741920
PETROLEUM HYDROCARBON OIL	64742525
Petroleum Middle Distillate	68476346
Petroleum Oil	64741895
PETROLEUM OIL	64742467
Petroleum Oil	64742650
Petroleum Process Oil	64742558
Petroleum Resin	64742161
Petroleum solvent	64771728
Phenol	108952
Phenol (90%) (See Phenol)	108952
Phenol Isopropylated, Phosphate	68937417
Phenoxyethanol (See Ethylene Glycol Monophenyl Ether)	122996
Phenyl Trimethicone	2116849
Phenylglycol ether	122996
Picloram, Potassium salt	2545600
Pine Oil	8002093
Pine oil (See Terpene Alcohols)	98555
Pine tar	8011481
Piperalin	3478942
Piperonyl Butoxide	51036
PM Acetate	84540578
PM Acetate (See Propylene Glycol Monomethyl Ether Acetate)	108656
p-Menthadiene	68956569
P-Menthadienes	68956569

Poly Solv DB (See Diethylene Glycol Monobutyl Ether)	112345
Poly Solv DE (See Diethylene Glycol Monoethyl Ether)	111900
Poly Solv EB (See Ethylene Glycol Monobutyl Ether)	111762
Polybutene	9003296
Polydimethylsiloxane	63148629
Polyethylene	9002884
Polyethylene Glycol	25322683
Polyethylene Glycol Dilaurate	9005021
Polyglycol 26-3	69029396
Polyglycol Dimethacrylate	25852475
Polyglycol P-2000	25322694
Polyisobutylene Solution	64742400
Polymethyl methacrylate	9011147
Polyoxyethylene Octyl Phenyl Ether (See Octylphenoxypolyethoxy ethanol)	9036195
Polysolve DM (See Diethylene Glycol Monomethyl Ether)	111773
Polytetra fluoroethylene	9002840
Potassium dimethyldithiocarbamate	128030
Potassium Sorbate	24634615
Primary Amyl Acetate (See Amyl Acetate)	628637
Process Oil	64742525
Prometon	1610180
Prometon - Technical (See Prometon)	1610180
Propane	74986
PROPANE/BUTANE/ISOBUTANE	68476857
Propanoic Acid, 3-Ethoxy-Ethyl Ester (See Ethyl-3-ethoxypropionate)	763699
Propanol, 1 (or 2) -2-methoxymethylethoxy-	34590948
PROPELLANT A-108 - PROPANE (See Propane)	74986
Propionic Acid	53404312
Propionic Acid	32351705
Propylene Glycol EP Solvent (See Ethylene Glycol Monopropyl Ether)	2807309
Propoxyethanol (See Ethylene Glycol Monopropyl Ether)	2807309
Propyl Acetate (See n-Propyl Acetate)	109604
Propylbenzene (See n-Propylbenzene)	103651
Propylcyclohexane	1678928
Propylene Glycol	25322694
Propylene Glycol (1,2-Propanediol)	57556
Propylene Glycol Methyl Ether (PGME)	107556
Propylene Glycol Methyl Ether (See Propylene Glycol Monomethyl Ether)	107982
Propylene Glycol Monobutyl Ether (1-Butoxy-2-propanol)	5131668
Propylene Glycol Monomethyl Ether (PGME) (1-Methoxy-2-Propanol)	107982
Propylene Glycol Monomethyl Ether Acetate (PGMEA) (1-Methoxy-2-Propanol Acetate)	108656
Propylene glycol T-Butyl Ether	57018527
Propylene glycol tertiary butyl ether	57018527
Propylene Glycol Methyl Ether Acetate (See Propylene Glycol Monomethyl Ether Acetate)	108656
pseudo-Cumene (See 1,2,4-Trimethylbenzene)	95636
PVP/VA Copolymer	25086899
Pyrenone CSE-10	8003347
Pyrethrins	8003347
Pyrethrum (PD-5 Residual) (See Pyrethrins)	8003347
Pyrocide Intermediate 5192 (Pyrethrin)	121211
Quaternary Blend (w/20% ethanol)	67784774
Quaternary Ammonium Chloride	31075248
Quaternary Ammonium Chloride (See Benzalkonium chloride)	8001545
RESIN A-BENZYL (See Benzyl Alcohol)	100516
S&S, Di-Me,Hydroxy-Terminated UVCB	70131678
Safety Solvent	64742809
Safety Solvent 200	64742809
Safrole	94597
Saponified Vegetable Oil (Green Soap)	8026708
SD 40 Alcohol	97702180

SD-Alcohol (See Ethanol)	64175
Sec-butanol (See 2-Butanol)	78922
sec-Butyl alcohol (See 2-Butanol)	78922
Silanamine, 1,1,1-Trimethyl-n-(Trimethylsilyl)	68909206
Silicic Acid (HASiO <sub>4</sub> ), Tetrapropyl	682019
Slane, Trimethoxymethyl-	1185553
S-O,O-Diisopropyl phosphorodithioate	741582
Sodium Alkyl Benzene Sulfonate	2211985
Sodium Cocoyl Sarcosinate	61791591
Sodium Dimethyldithiocarbamate	128041
Sodium Dodecylbenzene Sulfonate	25155300
Sodium Laureth Ether Sulfate (See Sodium lauryl ether sulfate)	9004824
Sodium Laureth Sulfate (See Sodium lauryl ether sulfate)	9004824
Sodium Laureth Sulfate (See Sodium Lauryl Sulfate)	151213
Sodium Laureth-12 Sulfate (See Sodium lauryl ether sulfate)	9004824
Sodium lauryl ether sulfate	9004824
Sodium Lauryl Sulfate	151213
Sodium Lauryl Sulfate Ether	1335724
Sodium Molybdate	7631950
Sodium Oleate	143191
Sodium Pareth-25 Sulfate (w/11% ethanol)	68891383
Sodium Tridecylbenzene Sulfonate	26248248
Sodium Xylene Sulfonate	1300727
SOL-71	64741657
Soltrol 145	64741657
SOLVENT NAPHTHA (PETROLEUM), LIGHT ALIPHATIC	64742898
Solvent Naphtha T500-100	64742956
SOLVENT REFINED LIGHT NAPHTHA	64741840
SOLVENT REFINED LIGHT NAPHTHENIC DISTILLATE	64741975
SORBITOL (D-Glucitol, C <sub>6</sub> H <sub>14</sub> O <sub>6</sub> )	50704
Soya bean oil	8013078
Spike Lavender Oil	8016782
Spruce oil	8008808
Standard Denatured Alcohol	77021810
Steam Distilled Wood Turpentine (See Turpentine)	8006642
Stearalkonium Chloride	122190
Stoddard solvent	8052413
STRAIGHT RUN MIDDLE PETROLEUM	64741442
Styrene (Ethenyl benzene)	100425
Sulfonated Castor Oil	68187768
Sulfonated Castor Oil	68187768
Sun Ag Oil 7N	64741884
SUN GOLDEN OIL #91 (SUN OIL CO.)	64742343
Sun Spray 6N	64741895
Sunpar 110	64741884
SWEETENED LIQUIFIED PETROLEUM GAS	68476858
Tall Oil	8002264
Tallow Imid Methosulfate	68122861
Tallow Imid Methosulfate	68122861
Tallowammonium Trimethyl Chloride	8030782
T-Amyl Alcohol	75854
t-Butyl Alcohol (See Tert-Butyl Alcohol)	75650
TEA-Laurel Sulfate	139968
Tenneco 500/100	25551137
Terpene	68956569
Terpene Alcohols	98555
Terpineol	8000417
Terpineol (alpha)	98555
Tert-Butyl Alcohol	75650
Tetrabutyl Titanate	5593704

Tetrachloroethylene (See Perchloroethylene)	127184
Tetrachloroisophtaianitrile	18947456
Tetraethylene Glycol	112607
Tetraethylene glycol (Di[2-ethylhexanoate])	18268707
Tetraethylene Glycol Dimethacrylate	109171
Tetraethylene Pentamine	112572
Tetrahydro-3,5-dimethyl-2-H-1,3,5-thiadiazine-2-e	533744
Tetrahydrofuran	109999
Tetrahydrofurfuryl Alcohol	97994
Tetramethylthiuran Disulfide	137268
Tetrapropyl Orthosilicate	68209
Tetrapropyl Orthosilicate (See Silicic Acid, Tetrapropyl)	682019
Tetrasodium EDTA	64028
Tetrohydrofuran	2455245
Texanol (2,2,4-Trimethyl-1,3-pentanediol-isobutyrate)	25265774
Texanol iso-butyrate (2,2,4-Trimethyl-1,3-pentanediol di-isobutyrate)	6846500
Textile spirits	64741840
Textile Spirits (See n-Hexane)	110543
Thiobencarb	28249776
Thiodan - Technical	115297
Thioglycolate, ammonium salt (See Ammonium Thioglycolate)	5421465
Thioglycolic Acid	68111
Thiram - Technical (See Tetramethylthiuran Disulfide)	137268
T-Mulz 2900, Harcos, Kansas	69980741
Toluene	108883
Trans-1,3-Dichloropropene	10061026
trans-Decalin	49327
Tri (beta-chloropropyl) phosphate	13674845
Tributoxy Ethyl Phosphate	78513
Trichlorfon (Phosphoric Acid, 2,2,2-trichloro-1-hydroxyethyl)-dimethyl ether	52686
Trichloroethylene (TCE)	79016
Trichlorofluoromethane (CFC-11)	75694
Trichlorotrifluoroethane (CFC-113) (See 1,1,2-Trichloro-1,2,2-trifluoroethane)	76131
Triethanolamine	102716
Triethanolamine Lauryl Sulfate	11178771
Triethyl Phosphite	122521
Triethylamine	121448
Triethylene Glycol	112276
Triethylene Glycol Dimethyl Ether (TEGDME)	112492
Triethylene Glycol Monobutyl Ether	143226
Triethylene Tetramine	68919799
Triethylenediamine	280579
Trifluoromethane (HFC-23)	75467
Trifluralin (a,a,a-Trifluoro-s,6-dinitro-n,n-dipropyl-p-toluide)	1582098
Trimethyl Benzene	25551137
Trimethylhexamethylenediamine	25513648
Triphenol Phosphate	115866
TRIPROPYLENE GLYCOL	25498491
Tripropylene Glycol Methyl Ether	25498491
Tripropylene glycol methyl ether	20324338
Tris (Hydroxymethyl) Nitromethane	126114
Triton	67923879
Triton X-200	67923879
Turpentine	8006642
Turpentine Oil Resin	8052140
Turpentine, gum (See Gum Turpentine)	9005907
Undecane	1120214
Undecenoic Acid	112389
Unsaturated Polyester Resin	25037665
URETHANE DIMETHACRYLATE	39318699

V.M. & P. Naphtha	64742898
Vegetable Glycerin (See 1,2,3-Propanetriol)	56815
Vinyl Acetate	108054
VM & P Naphtha	8032324
White Oil No. 9T (See Mineral oil, white)	8042475
Wickenol	22047490
Wilcolate A (See Sodium Lauryl Sulfate)	151213
Witch Hazel	68916392
Witch Hazel Distillate	68916781
Witch Hazel Extract	84696195
X 22-160	70131678
Xylene (Xylenes, mixed)	1330207
Xylene {chk CAS for mixture??}	108383
Xylene (ortho)	95476
Xylene (para)	106423
Xylene in technical - Methyl Parathion (See Xylene)	1330207
Xylene mixed O, M, & P Isomers (See Xylene)	1330207
Xylene-range aromatic solvent	64742954
Xylenes, mixed (See Xylene)	1330207
Xylenols - mixed	1300716
Xylol (p) (See Xylene (para))	106423
Zinc Napthenate	12001853

## ATTACHMENT D

## DEFINITIONS

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**“Adhesive”** means any product that is used to bond one surface to another by attachment. “Adhesive” does not include products used on humans and animals, adhesive tape, contact paper, wallpaper, shelf liners, or any other product with an adhesive incorporated onto or in an inert substrate. For “Contact Adhesive,” “Construction and Panel Adhesive,” and “General Purpose Adhesive” only, “adhesive” also does not include units of product, less packaging, which weigh more than one pound or consist of more than 16 fluid ounces. This limitation does not apply to aerosol adhesives.

**“Adhesive Remover”** means a product designed exclusively for the removal of adhesives, caulk and other bonding materials from either a specific substrate or a variety of substrates.

**“Aerosol Adhesive”** means an aerosol product in which the spray mechanism is permanently housed in a nonrefillable can designed for hand-held application [32 fluid ounces or less] without the need for ancillary hoses or spray equipment. [Aerosol Adhesive products are classified by the following type of application: mounting, general purpose, repositionable and high performance.] -

**“Aerosol Product”** means a pressurized spray system that dispenses product ingredients by means of a propellant or mechanically induced force. “Aerosol Product” does not include pump sprays.

**“Application”**

**General Purpose:** An aerosol adhesive that is designed for multi-purpose uses on a variety of substrates. An example would be a general duty arts and crafts adhesive.

**High Performance:** An aerosol adhesives that meets specialized performance requirements for demanding uses, such as, but not limited to, high contact bond strength, high temperature resistance, and plasticizer resistance. This category would include, but is not limited to:

1. Automotive applications, such as headliners, trim carpet, gaskets, dashboard, etc.
2. Laminating metal to rubber, rubber to rubber, low energy surfaces, polyolefins
3. Edge bonding
4. Cabinet and countertop installation, maintenance, touch-up and repair
5. Expanded polystyrene bead board

**Mounting:** An aerosol adhesive intended primarily for use in mounting photographs, artwork, and any other drawn or printed media to a backing (paper, board, cloth).

**Repositionable:** An aerosol adhesive that, once applied, allows two substrates to be temporarily separated and then reapplied without having to apply additional adhesive.

**“ASTM”** means the American Society for Testing and Materials.

**“Colorant”** means any pigment or coloring material used in a consumer product for an aesthetic effect, or to dramatize an ingredient.

## ATTACHMENT D

DEFINITIONS

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“**Commercial Product**” has the same definition as *institutional product*.

“**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; and automotive specialty products; but do not include paint, furniture coatings, or architectural coatings.

“**Contract Employee**” means a person hired by a company to sell that company's goods or products for an agreed upon commission or fee.

“**Custom Contract Packager**” means a company that manufactures products based on the specifications of another company and places the other company's name on the product *label*.

“**Distributor**” means any person to whom a *consumer product* is sold or supplied for the purposes of resale or distribution in commerce, except that *manufacturers, retailers, and consumers* are not *distributors*.

“**Employee**” means a person hired by another, or by a business firm, to work for wages or salary.

“**Exempt Compound**” means any of the following organic compounds: carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, ammonium carbonate, and the following:

- (A) methane,
- methylene chloride (dichloromethane),
- dichlorodifluoromethane (CFC-12),
- 1,1,1-trichloroethane (methyl chloroform),
- trichlorofluoromethane (CFC-11),
- 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113),
- 1,2-dichloro-1,1,2,2-tetrafluoroethane (CFC-114),
- chloropentafluoroethane (CFC-115),
- chlorodifluoromethane (HCFC-22),
- 1,1,1-trifluoro-2,2-dichloroethane (HCFC-123),
- 1,1-dichloro-1-fluoroethane (HCFC-141b),
- 1-chloro-1,1-difluoroethane (HCFC-142b),
- 2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124),
- trifluoromethane (HFC-23),
- 1,1,2,2-tetrafluoroethane (HFC-134),
- 1,1,1,2-tetrafluoroethane (HFC-134a),
- pentafluoroethane (HFC-125),
- 1,1,1-trifluoroethane (HFC-143a),
- 1,1-difluoroethane (HFC-152a),

## ATTACHMENT D

## DEFINITIONS

*volatile methyl siloxanes* and  
the following classes of perfluorocarbons:

1. cyclic, branched, or linear, completely fluorinated alkanes;
2. cyclic, branched, or linear, completely fluorinated ethers with no unsaturations;
3. cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations;
4. and sulfur-containing perfluorocarbons with no unsaturations and with the sulfur bonds to carbon and fluorine; and

(B) the following low-reactive organic compounds which have been exempted by the U.S. EPA:

1. acetone,
2. ethane,
3. parachlorobenzotrifluoride (1-chloro-4-trifluoromethyl benzene), and
4. perchloroethylene (tetrachloroethylene).

**“Fragrance”** means a substance or complex mixture of aroma chemicals, natural essential oils, and other functional components with a combined vapor pressure not in excess of 2 mm of Hg at 20°C, the sole purpose of which is to impart an odor or scent, or to counteract a malodor.

**“General Purpose”** (see *Application*)

**“Gross Annual Receipt”** means the overall total income of a company before expenses are deducted.

**“Household Product”** means any *consumer product* that is primarily designed to be used inside or outside of living quarters or residences that are occupied or intended for occupation by individuals, including the immediate surroundings.

**“High Performance”** (see *Application*)

**“Independently Owned”** means controlled by one self. Not dependent on another for financial support.

**“Industrial Product”** means a product designed and labeled exclusively for use in manufacturing processes whereby the product is incorporated into or used exclusively in the manufacture or construction of the goods or commodities (e.g., mold release used in plastic forms).

**“Institutional Product,”** or for the purposes of this survey, “commercial product,” means a *consumer product* that is designed for use in the maintenance or operation of an establishment that: (A) manufactures, transports, or sells goods or commodities, or provides services for profit; or (B) is engaged in the nonprofit promotion of a particular public, educational, or charitable cause. Establishments include, but are not limited to, government agencies, factories, schools, hospitals,

## ATTACHMENT D

## DEFINITIONS

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sanitariums, prisons, restaurants, hotels, stores, automobile service and parts centers, health clubs, theaters, or transportation companies. Institutional product does not include *household products* or products that are incorporated into or used exclusively in the manufacture or construction of the goods or commodities at the site of the establishment.

**“Mounting”** (see *Application*)

**“Label”** means any written, printed, or graphic matter affixed to, applied to, attached to, blown into, formed, molded into, embossed on, or appearing upon any consumer product or consumer product package, for purposes of branding, identifying, or giving information with respect to the product or to the contents of the package.

**“Lace Spray”** means an aerosol adhesive applied in a non-atomized form that results in a cobwebby or lace-like pattern of non-discreet particles, providing a rough-textured spray pattern.

**“Low Vapor Pressure-Volatile Organic compounds” (LVP-VOC)** means a chemical “compound” or “mixture” which contains at least one carbon atom and meets one of the following:

- (A) has a vapor pressure less than 0.1 mm Hg at 20°C, as determined by ARB Method 310; or
- (B) is a chemical “compound” with more than 12 carbon atoms, or a chemical “mixture” comprised solely of “compounds” with more than 12 carbon atoms, and the vapor pressure is unknown; or
- (C) is a chemical “compound” with a boiling point greater than 216°C, as determined by ARB Method 310; or
- (D) is the weight percent of a chemical “mixture” that boils above 216°C, as determined by ARB Method 310.

For the purposes of the definition of LVP-VOC, chemical “compound” means a molecule of definite chemical formula and isomeric structure, and chemical “mixture” means a substance comprised of two or more chemical “compounds”.

**“Manufacturer”** means any person who imports, manufactures, assembles, produces, packages, repackages, or relabels a *consumer product*.

**“Parent Company”** means the company or corporation that owns and controls other companies.

**“Particle Spray”** means an aerosol adhesive applied with atomization resulting in the formation of fine, discreet particles that yield a uniform, smooth surface.

**“Principal Display Panel”** means that part, or those parts of a *label* that are so designed as to most likely be displayed, presented, shown or examined under normal and customary conditions of display or purchase. Whenever a *principal display panel* appears more than once, all requirements pertaining

## ATTACHMENT D

## DEFINITIONS

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to the *principal display panel* shall pertain to all such *principal display panels*.

**“Private Label Contract Packager”** means a company that manufactures products for sale under another company's name.

**“Product Brand Name”** means the name of the product exactly as it appears on the *principal display panel* of the product.

**“Propellant”** means a liquefied or compressed gas that is used in whole or in part, such as a cosolvent, to expel a liquid or any other material from the same self-pressurized container or from a separate container.

**“Pump Spray”** means a packaging system in which the product ingredients within the container are not under pressure and in which the product is expelled only while a pumping action is applied to a button, trigger or other actuator.

**“Responsible Party”** means the company, firm or establishment which is listed on the product's *label*. If the *label* lists two companies, firms or establishments, the responsible party is the party which the product was “manufactured for” or “distributed by”, as noted on the label.

**“Retailer”** means any person who sells, supplies, or offers *consumer products* for sale directly to consumers.

**“Regional”** means of some particular area in the nation (e.g., the West Coast which includes Washington, Oregon, and California).

**“Repositionable”** (see *Application*)

**“Sealant and Caulking compound”** means any product with adhesive properties that is designed to fill, seal, waterproof, or weatherproof gaps or points between two surfaces. These products are used to prevent air infiltration, heat loss, water penetration, insect entry, or to improve appearance. Sealant and Caulking compound does not include architectural coatings such as protective finishes for wood, tile and other flooring, or automotive products.

**“Volatile Methyl Siloxane”** means cyclic, branched, or linear completely methylated siloxanes.

**“Volatile Organic Compound (VOC)”** means any compound containing at least one atom of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, and excluding any *exempt compound*.



## ATTACHMENT E

### Title 17, California Code of Regulations Subchapter 4. Disclosure of Public Records

#### Article 1. General

##### §91000. Scope and Purpose.

This subchapter shall apply to all requests to the state board under the California Public Records Act (Government Code Sections 6250 et seq.) for the disclosure of public records or for maintaining the confidentiality of data received by the state board. Written guidelines shall govern the internal review of such requests.

NOTE: Authority cited: Sections 39600 and 39601(a), Health and Safety Code. Reference: California Public Records Act, Chapter 3.5 (commencing with Section 6250), Division 7, Government Code.

##### HISTORY

1. New Subchapter 4 (Sections 91000 through 91022, not consecutive) filed 1-26-73; effective thirtieth day thereafter (Register 73, No. 4).
2. Amendment filed 9-28-73; effective thirtieth day thereafter (Register 73, No. 39).
3. Amendment of NOTE filed 3-18-77; effective thirtieth day thereafter (Register 77, No. 12).
4. Repealer and new section filed 10-5-82; effective thirtieth day thereafter (Register 82, No. 41).

##### §91001. Disclosure Policy.

It is the policy of the state board that all records not exempted from disclosure by state law shall be open for public inspection with the least possible delay and expense to the requesting party.

NOTE: Authority cited: Sections 39600 and 39601(a), Health and Safety Code. Reference: Section 6253, Government Code; Black Panther Party v. Kehoe (1974) 42 Cal.App.3d 645.

##### HISTORY

1. Amendment filed 9-28-73; effective thirtieth day thereafter (Register 73, No. 39).
2. Amendment and new NOTE filed 3-18-77; effective thirtieth day thereafter (Register 77, No. 12).
3. Repealer and new section filed 10-5-82; effective thirtieth day thereafter (Register 82, No. 41).

#### Article 2. Board's Requests for Information

##### §91010. Request Procedure.

The state board shall give notice to any person from whom it requests information that the information provided may be released (1) to the public upon request, except trade secrets which are not emission data or other information which is exempt from disclosure or the disclosure of which is prohibited by law, and (2) to the federal Environmental Protection Agency, which protects trade secrets as provided in Section 114(c) of the Clean Air Act and amendments thereto (42 USC 7401 et seq.) and in federal regulations.

NOTE: Authority cited: Sections 39600, 39601 and 39602, Health and Safety Code. Reference: Sections 39701, 41510, 41511, 41512 and 42705, Health and Safety Code; and Section 6253, Government Code.

## ATTACHMENT E

### HISTORY

1. Amendment of subsections (a) and (b) filed 9-28-73; effective thirtieth day thereafter (Register 73, No. 39).
2. Amendment of subsection (a), (b) and (c), and new NOTE, filed 3-18-77; effective thirtieth day thereafter (Register 77, No. 12).
3. Amendment filed 10-5-82; effective thirtieth day thereafter (Register 82, No. 41).
4. Editorial correction filed 5-7-84; effective thirtieth day thereafter (Register 84, No. 19).

### §91011. Submissions of Confidential Data.

Any person submitting to the state board any records containing data claimed to be "trade secret" or otherwise exempt from disclosure under Government Code Section 6254 or 6254.7 or under other applicable provisions of law shall, at the time of submission, identify in writing the portions of the records containing such data as "confidential" and shall provide the name, address and telephone number of the individual to be contacted if the state board receives a request for disclosure of or seeks to disclose the data claimed to be confidential. Emission data shall not be identified as confidential. The state board shall not disclose data identified as confidential, except in accordance with the requirements of this subchapter or Section 39660(e) of the Health and Safety Code.

NOTE: Authority cited: Sections 39600 and 39601, Health and Safety Code. Reference: Sections 39660, 39701, 41500, 41511, 41512 and 42705, Health and Safety Code; Sections 6253, 6254 and 6254.7, Government Code; *Natural Resources Defense Council v. EPA*, 489 F.2d 390 (5th Cir. 1974) (6 ERC 1248); *Northern California Police Practices Project v. Craig* (1979) 90 Cal.App.3d 116; *Uribe v. Howie* (1971) 19 Cal.App.3d 194.

### HISTORY

1. New section filed 10-5-82; effective thirtieth day thereafter (Register 82, No. 41). For history of former section, see Register 73, No. 39.
2. Amendment filed 7-10-84; effective thirtieth day thereafter (Register 84, No. 28).

## Article 3. Inspection of Public Records

### §91020. Disclosure Policy.

### HISTORY

1. Repealer filed 10-5-82; effective thirtieth day thereafter (Register 82, No. 41).

### §91021. Disclosure Procedure.

NOTE: Authority cited: Section 39601, Health and Safety Code. Reference: Sections 6253-6257, Government Code.

### HISTORY

1. Amendment of subsections (c) and (d)(3) filed 9-28-73; effective thirtieth day thereafter (Register 73, No. 39).
2. Amendment and new NOTE filed 3-18-77; effective thirtieth day thereafter (Register 77, No. 12).
3. Repealer filed 10-5-82; effective thirtieth day thereafter (Register 82, No. 41).

### §91022. Disclosure of Confidential Data.

- (a) This section shall apply to all data in the custody of the state board

## ATTACHMENT E

(1) designated "trade secret" prior to the adoption of this subchapter,  
 (2) considered by the state board or identified by the person who submitted the data as confidential pursuant to this subchapter, or

(3) received from a federal, state or local agency, including an air pollution control district, with a confidential designation, subject to the following exceptions:

(A) Except for the time limits specifically provided in subsection (b), only subsections (c) and (d) of this section shall apply to information submitted pursuant to Health and Safety Code Section 39660(e).

(B) Appropriate portions of an application for approval, accreditation, or certification of a motor vehicle emission control device or system shall be kept confidential until such time as the approval, accreditation, or certification is granted, at which time the application (except for trade secret data) shall become a public record, except that estimates of sales volume of new model vehicles contained in an application shall be kept confidential for the model year, and then shall become public records. If an application is denied, it shall continue to be confidential but shall be subject to the provisions of this section.

(C) If disclosure of data obtained after August 9, 1984 from a state or local agency subject to the provisions of the Public Records Act is sought, the state board shall request that the agency which provided the data determine whether it is confidential. The state board shall request that it be notified of the agency's determination within ten days. The state board shall not release the data if the agency determines that it is confidential and so notifies the state board; provided, however, that the data may be released with the consent of the person who submitted it to the agency from which it was obtained by the state board.

(b) Upon receipt of a request from a member of the public that the state board disclose data claimed to be confidential or if the state board itself seeks to disclose such data, the state board shall inform the individual designated pursuant to Section 91011 by telephone and by mail that disclosure of the data is sought. The person claiming confidentiality shall file with the state board documentation in support of the claim of confidentiality. The documentation must be received within five (5) days from the date of the telephone contact or of receipt of the mailed notice, whichever first occurs. In the case of information submitted pursuant to Health and Safety Code Section 39660(e), the documentation must be received within 30 days of the date notice was mailed pursuant to that section. The deadlines for filing the documentation may be extended by the state board upon a showing of good cause made within the deadline specified for receipt of the documentation.

(c) The documentation submitted in support of the claim of confidentiality shall include the following information:

- (1) the statutory provision(s) under which the claim of confidentiality is asserted;
- (2) a specific description of the data claimed to be entitled to confidential treatment;
- (3) the period of time for which confidential treatment is requested;
- (4) the extent to which the data has been disclosed to others and whether its confidentiality has been maintained or its release restricted;
- (5) confidentiality determinations, if any, made by other public agencies as to all or part of the data and a copy of any such determinations, if available; and
- (6) whether it is asserted that the data is used to fabricate, produce, or compound an article of trade or to provide a service and that the disclosure of the data would result in harmful effects on the person's competitive position, and, if so, the nature and extent of such anticipated harmful effects.

(d) Documentation, as specified in subsection (c), in support of a claim of confidentiality may be submitted to the state board prior to the time disclosure is sought.

(e) The state board shall, within ten (10) days of the date it sought to disclose the data or received the request for disclosure, or within 20 days of that date if the state board determines that there are unusual circumstances as defined in Government Code Section 6256.1, review the request, if any, and supporting documentation, if received within the time limits specified in subsection (b) above, including any extension granted, and determine whether the data is entitled to confidential treatment pursuant to Government Code Section 6254, 6255 or 6254.7 or other applicable provisions of law and shall either:

(1) decline to disclose the data and, if a request was received, provide to the person making the request and to the person claiming the data is confidential a justification for the determination pursuant to Government Code Section 6255; or

**ATTACHMENT E**

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(2) provide written notice to the person claiming the data is confidential and, if a request was received, to the person requesting the data that it has determined that the data is subject to disclosure, that it proposes to disclose the data, and that the data shall be released 21 days after receipt of the notice by the person claiming confidentiality, unless the state board is restrained from so doing by a court of competent jurisdiction. The state board shall release the data in accordance with the terms of the notice unless so restrained.

(f) Should judicial review be sought of a determination issued in accordance with subsection (e), either the person requesting data or the person claiming confidentiality, as appropriate, may be made a party to the litigation to justify the determination.

NOTE: Authority cited: Section 39601, Health and Safety Code. Reference: Sections 6253, 6254, 6254.7, 6255, 6256, 6256.1, 6258 and 6259, Government Code.

**HISTORY**

1. Amendment of subsections (a) and (b) filed 9-28-73; effective thirtieth day thereafter (Register 73, No. 39).
2. Amendment and new NOTE filed 3-18-77; effective thirtieth day thereafter (Register 77, No. 12).
3. Amendment filed 10-5-82; effective thirtieth day thereafter (Register 82, No. 41).
4. Editorial correction of subsection (a) filed 5-7-84; effective thirtieth day thereafter (Register 84, No. 19).
5. Amendment filed 7-10-84; effective thirtieth day thereafter (Register 84, No. 28).

**APPENDIX E: DISCUSSION OF AEROSOL ADHESIVES SURVEY RESULTS**



## Discussion of Aerosol Adhesives Survey Results

In March 1999 ARB staff sent out a survey to aerosol adhesive manufacturers and private label companies. The survey was sent out to help companies comply with the requirements of CCR section 94513(d), which requires that companies report to the ARB their 1998 product sales and formulation information, and their research efforts to manufacture low VOC aerosol adhesives. A copy of the survey package is included as Appendix D.

The survey package was patterned after the 1997 Consumer and Commercial Products Survey. The survey form consisted of three parts: company information, product information, and research and development efforts. Under company information, we requested information on company economics, type of business, and size. Under product information, we requested information on sales, spray characteristics, use, and formulation for each product. Lastly, under research and development efforts, we requested companies to list what technologies they have tested and their conclusions on the technological and economic feasibility of each technology.

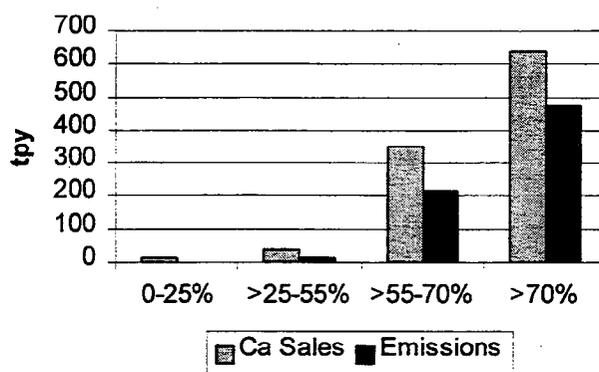
The survey package was sent to all companies that reported sales of adhesives for the 1995 and 1997 survey. Staff added to the list by obtaining names from shelf surveys and Internet searches. Shelf surveys were conducted in hardware, automotive, craft, and fabric shops. Staff also visited some industrial users and asked to see supply catalogs. Some industrial users were called by telephone and asked for product names. Staff also contacted major formulators to assist in identifying private label products. However, formulators typically mark this information as confidential and we were only partially successful in identifying private label companies, which generally make up a smaller part of the market.

After compiling the survey results, staff compiled summaries showing company and product listings, the breakdown of sales and emissions by adhesive type, and VOC ranges and averages. Sales and emissions data are summarized in the following section. The research and development data are discussed in Appendix F.

### 1. Survey Results

A total of 47 companies submitted information on sales of aerosol adhesives in California. The product information shown in the following tables are from products that were sold in California during 1998. There are a total of 136 products which total 1039 tons per year (tpy) of sales. These products account for 703 tpy of VOCs. Attachment 1 a listing of companies and products in the survey. One survey form was handed in after preliminary data had been released. This company and product are labeled as Company x and product x to protect confidentiality.

Figure E-1 graphically shows the product distribution in tons per year of sales and emissions by VOC level. With the exception of gasket adhesives, formulations of

**Figure E-1: All Aerosol Adhesive Products by Percent VOC**

products with less than 55 percent VOC contained methylene chloride, perchloroethylene, or water. Gasket adhesives comprise 24% of the product sales for products less than 55 percent VOC content.

The survey data was broken out into the following categories: mounting, high performance, repositionable, and general purpose. These categories were proposed by industry. The mounting category is intended primarily for use in mounting photographs, artwork, and any other drawn or printed media to a backing (paper, board, cloth). The high performance category is intended for an adhesive that met specialized performance requirements for demanding uses, such as, but not limited to, high contact bond strength, high temperature resistance, and plasticizer resistance. This category includes automotive applications, lamination for cabinet and countertop, edge bonding, polyolefins, and expanded polystyrene bead board. The repositionable category is intended for adhesives that, once applied, allowed for removal and repositioning of the substrates without having to apply additional adhesive. General purpose is intended for adhesives used in multi-purpose applications on a variety of substrates. Table E-1 shows the sales and emissions in tons per year for each of the four categories.

**Table E-1: Aerosol Adhesives 1998 CA Sales and Emissions**

<i>Adhesive Category</i>	<i>Sales (tons/yr)</i>	<i>VOC (tons/yr)</i>
Mounting	49	30
High Performance	425	267
Repositionable	41	30
General Purpose	524	376
<b>Total</b>	<b>1039</b>	<b>703</b>

categories. Over 90% of the products were categorized into the general purpose and high performance categories.

Staff evaluated the use of toxic compounds such as methylene chloride perchloroethylene, and trichloroethylene in aerosol adhesives. Staff found 18.3 tpy of methylene chloride were used in formulations for products sold in 1998. In contrast, only three products were formulated with perchloroethylene and one with trichloroethylene. Total perchloroethylene and trichloroethylene usages were 0.4 tpy and 0.06 tpy, respectively. Table E-2 shows the methylene chloride usage among the four adhesives categories.

**Table E-2: Methylene Chloride Use in Aerosol Adhesives**

<i>Adhesive Category</i>	<i>MeCl (tpy)</i>	<i>MeCl VOC</i>	<i>Percent</i>
Mounting	0.2	<.01	1
High Performance	6.1	.02	33
Repositionable	1.8	.06	10
General Purpose	10.2	.03	56
Total	18.3	.03	100

The first column shows methylene chloride use. The second column shows the ratio of tons of methylene chloride to tons of VOC for all products. The third column shows the percentage breakdown of methylene chloride use among the four categories. Note that even though products in the "repositionable category" had a higher ratio of methylene chloride/VOC, the total amount of methylene chloride used was low (10%) because of low sales. The table shows that overall very little methylene chloride was used in aerosol adhesives in 1998.

After the November public meeting to discuss the survey results, the National Paint and Coatings Association (NPCA) recognized inherent problems associated with this method of categorization. Many products had characteristics of several categories. Adhesives are generally marketed for as broad a market as possible. Consequently, many products could be categorized in multiple categories. The NPCA proposed a new system of categorizing aerosol adhesives based on three categories: special purpose, general mist, and general web. Staff has revised the categories general mist and general web to mist and web to remove any ambiguity associated with the term "general" as it applies to product labels versus product VOC limits. NPCA proposed definitions for these categories as indicated below. The definitions were modified for clarity.

Special purpose adhesives are defined as:

*"adhesives that meet specialized performance requirements for demanding uses, such as, but not limited to, high contact bond strength, high temperature resistance, and plasticizer resistance. This category includes mounting aerosol adhesives and aerosol adhesives designed for special substrates."*

mist and web adhesives were defined as adhesives with mist and web spray patterns that were not included under special purpose. A mist spray pattern is defined as:

*“a spray pattern which delivers a particle or mist spray, resulting in the formation of fine, discrete particles that yield a generally uniform and smooth application of adhesive to the substrate. The spray pattern must be a solid mist, conical mist or fan spray pattern.”*

A web spray pattern is defined as:

*“a spray that is applied in a fan-like pattern, resulting in a non-uniform web-like pattern of adhesive applied to the substrate.”*

Attachment 2 is a detailed listing of the VOC, exempt, and LVP-VOC (solids) contents for each product broken out into the following NPCA proposed categories: mist, web, and special purpose. Under the special purpose category, the products are further broken out into three sub-categories: (1) mounting and flexible vinyl, (2) headliner and polystyrene foam, and (3) countertop laminate and polyolefins. The product grouping does not reflect how companies plan to market their products. Instead it represents the number of products that, based on the product survey and product labels, indicate that these products should be placed into these categories. However, under the proposed categorizations, products marketed under the special purpose category must adhere to strict labeling requirements that would limit market appeal to a specific end user. Therefore, we expect the final mix to have fewer products in the special purpose category.

Table E-3 shows the product distribution based on the NPCA proposed category groups according to products with and without methylene chloride,

**Table E-3: Product Distribution by Category**

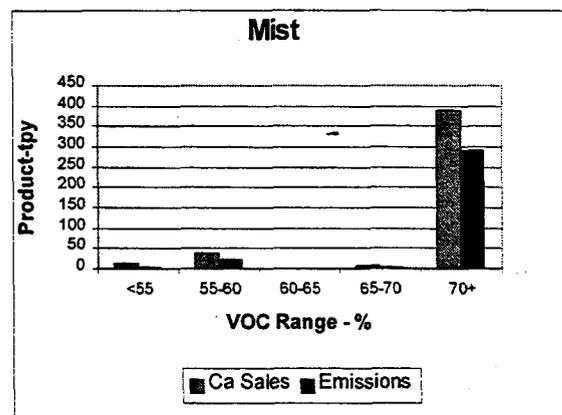
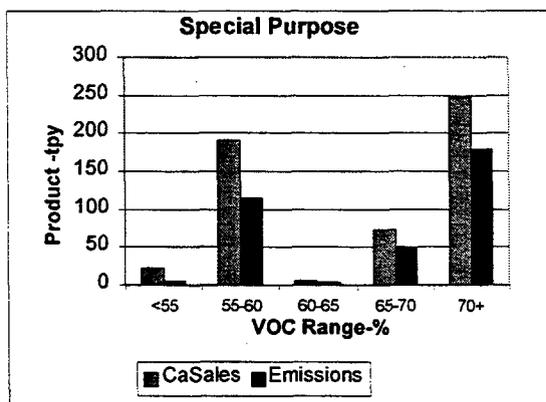
	Number	Sales (tpy)	Emissions (tpy)	VOC Range (%)	Wt-Avg VOC
<i>Without MeCl/PercTCE*</i>					
Mist	25	444	321	29-92	72
Web	13	41.1	26.4	43-95	64
Special Purpose	65	519	344	0-89	66
<i>With MeCl/Perc/TCE</i>					
Mist	10	1.9	0.6	19-44	29
Web	7	15.3	4.8	21-40	30
Special Purpose	16	17.1	6.0	26-75	35

\* Methylene chloride, perchloroethylene, and trichloroethylene are abbreviated as follows: MeCl, Perc, and TCE.

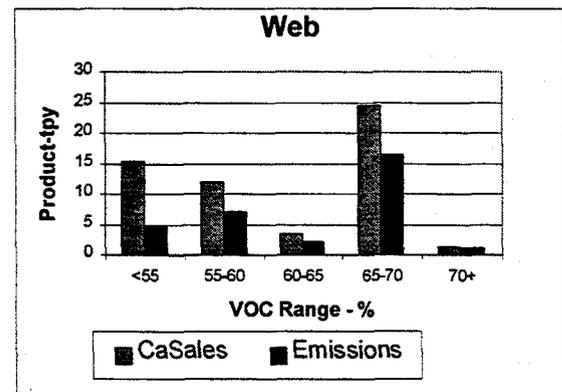
perchloroethylene, and trichloroethylene. Note that there are only 33 products formulated with methylene chloride, perchloroethylene, or trichloroethylene. Sales of these products comprise about 3 percent of the total sales.

Product distributions by percent VOC for each category are shown in Figure E-2. Products under 55 percent VOC, with the exception of gasket adhesives,

**Figure E-2: Distributions of Adhesives by VOC Content**



are mainly methylene chloride formulations. Each category has a distinct distribution. In the special purpose category, products can be found in the low and high VOC ranges. In the mist category, products are concentrated in the above 70 percent range. Mist sprays require a higher solvent to solids ratio in order to obtain a uniform, fine particle spray. For web sprays, these products fall relatively evenly between the 55-70% VOC range.



## Attachment 1: Product Listing by Company

Company Name	Product Name
3M	3M Photo Mount Adhesive 6092 6094
3M	3M VAC-U Mount Adhesive 6096
3M	3M Super Trim Adhesive PN8090 PN8091
3M	3M General Trim Adhesive PN8088 PN8089
3M	3M Spray Trim Adhesive PN08074
3M	3M 80 Neoprene Contact Adhesive
3M	3M 90 Hi-Strength Adhesive
3M	3M Foam Fast Adhesive 74
3M	3M Blue 72 Pressure Sensitive Adhesive
3M	3M Spray Disc Adhesive PN08054
3M	3M Repositionable 75 Spray Adhesive
3M	3M ReMount Repositionable Adhesive 6091
3M	3M 201 General Purpose Spray Adhesive
3M	Craft & Workshop Spray Adhesive 6081 6082
3M	3M Spray-Mount Adhesive 6065
3M	Shipping Mate (TM) Case Sealing Adhesive
3M	Shipping-Mate (TM) Labeling Adhesive
3M	3M Spray Adhesive
3M	Shipping Mate (TM) Palletizing Adhesive
3M	3M Sprament Craft and Display Adhesive
3M	3M Super 77 Spray Adhesive
3M	3M 76 Hi-Tack Adhesive
3M	3M Multi Purpose Spray Adhesive PN 08873
Amrep	315-20/24 Heavy Duty Web Adhesive
Amrep	317-24 Foam and Fabric Adhesive
Amrep	309-20 Webbing Adhesive VF
Amrep	314-20/24 Multipurpose Web Adhesive
Amrep	311-211 Super Stuck up
Anti-Seize Technology	Adhesive Spray, Multi-Purpose
Bondo/Mar-Hyde Corporation	General Trim Adhesive
Bondo/Mar-Hyde Corporation	Bondo Spray Adhesive
Bostik Inc.	Supertak Trim Adhesive
Bostik Inc.	Supertak Contact Type
Bostik Inc.	Supertak High Performance
Bostik Inc.	Supertak Mist
Bostik Inc.	Supertak General Purpose
C. R. Laurence, Inc.	CRL66 Work Site Spray Adhesive
Camie-Campbell Inc.	393 Trim & Laminating Adhesive
Camie-Campbell Inc.	365 Hi-Bond High Strength Spray Adhesive
Camie-Campbell Inc.	313 Fast Tack Upholstery Adhesive
Camie-Campbell Inc.	363 High Strength Fast Tack Adhesive
Camie-Campbell Inc.	303 Foam & Fabric Spray Adhesive
Camie-Campbell Inc.	301 Textile Spray Adhesive
Camie-Campbell Inc.	373 Hi Performance Adhesive
Camie-Campbell Inc.	343 Construction Adhesive
Camie-Campbell Inc.	385 Webbing Screen Printers' Adhesive
Camie-Campbell Inc.	375 Screen Printers Flash Cure Spray Adhesive
Camie-Campbell Inc.	380 Screen Printers Adhesive
Camie-Campbell Inc.	333N Spray Adhesive
Camie-Campbell Inc.	300 General Purpose Spray Adhesive
Cascade Sales & Mfg.	Glitter Glue
Cascade Sales and Manufacturing	721 U-2 Adhesive
Cascade Sales and Manufacturing	720 U-2 Adhesive
CCL Custom Manufacturing, Inc.	Crown No. 8192 Spray Contact Adhesive
CCL Custom Manufacturing, Inc.	Crown No. 8091 Heavy Duty Permanent Adhesive
CCL Custom Manufacturing, Inc.	Crown No. 8090 General Purpose Adhesive
Chromate Products Corp	Pow-R-Bond

Company Name	Product Name
Claire Manufacturing	Multi-Purpose Adhesive Spray CL066
Company X*	Product X
Crown Embroidery Supply	Spray Adhesive
Cyclo Industries, LLC	C-900, Spray Adhesive
DAP Inc.	DAP Weldwood Spray'n Glue
Delta Technical Coatings, Inc.	Ceram Decor Permenamel Stencil Adhesive Spray
Delta Technical Coatings, Inc.	Delta Stencil Magic Adhesive Spray
Design Master Color Tool Inc	Tack 2000 Spray Adhesive
Design Master Color Tool Inc	Tack 1000 Spray Adhesive
Drummond American Corporation	Affix
Elmer's Products, Inc.	Elmer's Craft Bond Multipurpose Spray Glu
Elmer's Products, Inc.	Elmer's Spray Adhesive
Ezon Products, Inc.	Master General Trim Adhesive #GTA-80
Ezon Products, Inc.	Master High Tack Adhesive #10
Hurst Chemical Company	Web Pallet Adhesive 122
Hurst Chemical Company	Spray Adhesive 91
Illinois Tool Works	Copper Spray Adhesive
Illinois Tool Works	Sure Tack Aerosol
Imperial Adhesives Inc.	PG107AA
Imperial Adhesives Inc.	PG105AA
Kar Products Inc.	Hi Tack Gasket Adhesive TM 3163
Kar Products Inc.	Kar All Purpose Adhesive & Trim Cement
Lawson Products, Inc.	Gask-A-Seal
Lawson Products, Inc.	Sanding Disc Spray Adhesive
Lawson Products, Inc.	SUPER 77 SPRAY ADHESIVE
Loctite Corporation	Permatex Body Shop Heavy Duty Spray Adhesive-27828
Loctite Corporation	Permatex Blue Spray Adhesive 30185
Loctite Corporation	Blair Stencil Stik 60006
Loctite Corporation	Blair Maximum Strength Spray Adhesives-82489
Loctite Corporation	Permatex All Purpose Spray Adhesive 82019
Loctite Corporation	Blair Artists Mounting Adhesive - 82490
Loctite Corporation	Duro All Purpose Spray Adhesive-81088
Lord Corporation	Fusor Heavy Duty External Spray Adhesive
Lord Corporation	Fusor Interior Spray Mist Adhesive
Marsh Company	Marsh Spray Adhesive
Mohawk Finishing Products, Inc.	Spray Adhesive
NCH Corporation	Steadfast/Spraybond
Pacific Upholstery Supply Corp.	Foam Spray Adhesive #325
Pacific Upholstery Supply Corp.	Pacific P-74 Adhesive
Pacific Upholstery Supply Corp.	Pacific 425 Adhesive
Pierce & Stevens	Hybond 1010
Premier Farnell Plc.	Gasket Adhesive (91660)
Premier Farnell Plc.	Gasket Adhesive 10250
Premier Farnell Plc.	Quik Stick (91680)
Premier Farnell Plc.	Ultra Stick Adhesive (10520)
Sherwin Williams	Krylon Easy Tack
Sherwin Williams	Krylon Repositional Adhesive
Sherwin Williams	Poly Film Adhesive
Sherwin Williams	Krylon Fast Tack Adhesive
Sherwin Williams	Krylon Permanent Adhesive

\*Company X submitted its survey response after staff had already published a listing of individual product VOCs. To protect confidentiality, the company and product have been identified as "Company X" and "Product X."

**Attachment 1 (Continued)**

<b>Company Name</b>	<b>Product Name</b>
SIA Adhesives	S900
SIA Adhesives	S707
Smithers-Oasis U.S.A	Floralock (TM) Stem Adhesive
Specialty Chemical Resources, Inc.	AMP HD All Purpose Adhesive
Specialty Chemical Resources, Inc.	AMP Spray Adhesive
Specialty Chemical Resources, Inc.	TMP #800 All Purpose Adhesive
Sprayway	SW022 Artist's Adhesive
Sprayway	No 092 Hi Temp Heavy Duty Trim Adhesive (SW092)
Sprayway	SW057 General Trim Adhesive
Sprayway	SW055 Foam and Fabric Adhesive
Sprayway	No 822 Embroidery Spray Adhesive (SW822)
Sprayway	No. 80 Web Type Adhesive Spray (SW080)
Sprayway	SW083 Web Type Spray Adhesive
Sprayway	No 84 Super Flash Spray Adhesive (SW084)
Sprayway	SW082 Mist Type Spray Adhesive
Sprayway	Multi Purpose 88 Spray Adhesive (SW088)
Sprayway	SW066 Adhesive Spray
State Chemical Mfg. Co.	ADH
Stretch Coat	Multi-Purpose Adhesive Spray
Sullivans USA	Art & Craft Adhesive Spray or Make-A-Memory Ultra Adhesiv
Sullivans USA	Machinery Embroidery Adhesive Spray, Make-A-Memory Re
Sullivans USA	Quilt Basting Spray
Syndicate Sales	Bouquet Hold Adhesive
Transtar Autobody Technologies	Super Stick Trim Adhesive
Uline	Uline Fast Tack Adhesive S-313
Wilsonart International, Inc.	Lokweld (R) 800A
Winzer Corporation	Non-Chlorinated Spray Trim Adhesive
Zep Manufacturing Company	Zep Stick
Zep Manufacturing Company	Zep Aero Tac

Special Purpose							
Mounting & Flexible Vinyl							
No.	VOC %	LVP %	Exempt	No.	VOC %	LVP %	Exempt
1	38.9	7.8	53.3	7	67.5	14	18.5
2	51.2	14.3	34.5	8	69	12.6	18.4
3	60.5	20.8	18.7	9	71.3	14.7	14
4	64.6	17.6	17.8	10	71.3	14.7	14
5	64.6	17.6	17.8	11	79.8	20	0.02
6	66.5	17	16.5	12	84.5	15.5	0
Headliner & Polystyrene Foam							
No.	VOC %	LVP %	Exempt	No.	VOC %	LVP %	Exempt
1	0	45.88	54.12	26	70.1	10	19.9
2	25.5	9.2	65.3	27	70.5	12.2	17.3
3	25.83	8.17	66	28	71.8	16.8	11.4
4	25.83	8.17	66	29	72	16.5	11.5
5	25.83	8.17	66	30	72	16.5	11.5
6	33	13	54	31	72.6	15.1	12.3
7	39	9	52	32	72.6	15.1	12.3
8	46.9	8.12	45	33	73.13	12.26	14.61
9	46.9	8.12	45	34	73.7	24.8	1.5
10	47.67	8.48	43.85	35	74	26	0
11	53.8	10.8	35.4	36	74.5	25.5	0
12	58	17	25	37	74.5	25.5	0
13	58.3	16.7	25	38	74.75	25.2	0.05
14	58.3	16.7	25	39	74.75	25.2	0.05
15	60	22	18	40	74.799	25.201	0
16	60.5	20.8	18.7	41	75	8.6	16.4
17	63	23	14	42	75	15.3	9.7
18	63.2	24	12.8	43	75	15.3	9.7
19	64.9	17.5	17.6	44	75	8.6	16.4
20	66.4	17.1	16.5	45	75	8.6	16.4
21	66.4	17.1	16.5	46	75	8.6	16.4
22	67.5	13.7	18.8	47	75	12	13
23	68.35	18.99	12.66	48	75	12.5	12.5
24	69.3	13.7	17	49	84.5	15.5	0
25	70	16.5	13.5	50	89	11	0
Countertop Laminate & Polyolefins							
No.	VOC %	LVP %	Exempt	No.	VOC %	LVP %	Exempt
1	35	18.84	46.16	11	67.5	15	17.5
2	54.3	20.2	25.5	12	68.9	15.2	15.9
3	57.01	13.09	29.9	13	69.449	18.851	11.7
4	60	14.8	25.2	14	69.45	18.85	11.7
5	60	20	20	15	70.4	12.7	16.9
6	60	20	20	16	70.89	15	14.11
7	64.6	17.5	17.9	17	73.5	26.5	0
8	66.5	17	16.5	18	75	25	0
9	66.5	17	16.5	19	84.5	15.5	0
10	66.98	20.37	12.65				

Note: The headings VOC and Exempt correspond to entries (A) and (B) on Forms IV-A and IV-B on the 1998 Aerosol Adhesives Survey Form. The heading LVP consists of the remainder of the formulation, which is mainly the rubbers/resins.

## Attachment 2 (continued)

Mist							
No.	VOC %	LVP %	Exempt	No.	VOC %	LVP %	Exempt
1	19	8	73	19	70	18.5	11.5
2	23.9	8.1	68	20	72	28	0
3	25	25	50	21	72	28	0
4	25	25	50	22	72.92	15.65	11.43
5	26.211	8.72	65.069	23	73	18.3	8.7
6	28.6	14.1	57.3	24	73.78	21.1	5.2
7	29.4	16.9	53.7	25	74.11	25.89	0
8	31.6	8.4	60	26	74.3	25.7	0
9	37.6	5.3	57.1	27	74.4	25.6	0
10	37.6	5.3	57.1	28	74.62	1.5	24.1
11	39.9	5.1	55	29	74.685	25.315	0
12	40.47	13.5	46.03	30	74.8	25.2	0
13	43.2	1.21	55.59	31	75	25	0
14	54.7	13.3	32	32	84.5	15.5	0
15	57.5	9.1	33.4	33	84.5	15.5	0
16	57.5	9.3	33.2	34	90.1	9.9	0
17	62.83	11.41	25.76	35	91.5	8.5	0
18	70	16.5	13.5				
Web							
No.	VOC %	LVP %	Exempt	No.	VOC %	LVP %	Exempt
1	20.69	15.86	63.45	11	63	2	35
2	25	NA	NA	12	63	2	35
3	25	16.5	58.5	13	64.6	17.6	17.8
4	30.002	16.545	53.453	14	66	18	16
5	35	19.51	45.49	15	66.1	22.3	11.6
6	40	6	54	16	66.2	13	20.8
7	42.39	12.81	44.8	17	69.5	14.2	16.3
8	58.9	24.5	16.6	18	74.8	25.2	0
9	60	22	18	19	84.5	15.5	0
10	60	20	20	20	94.7	1.1	4.2

Note: The headings VOC and Exempt correspond to entries (A) and (B) on Forms IV-A and IV-B on the 1998 Aerosol Adhesives Survey Form. The heading LVP consists of the remainder of the formulation, which is mainly the rubbers/resins.

**APPENDIX F: 1999 TECHNICAL ASSESSMENT OF AEROSOL ADHESIVES**



## 1999 Technical Assessment of Aerosol Adhesives

In 1996 ARB staff conducted a technology assessment on aerosol adhesives and identified several potential methods for reducing the amount of VOCs in aerosol adhesives. The 1998 Aerosol Adhesives Survey included a section on manufacturers' research and development efforts to update staff's earlier assessment. The survey was structured to gather information on the various methods of reducing VOCs: use of alternative solvents, use of alternative propellants, increasing the solids content, and hardware modifications. This discussion summarizes staff's 1999 technical assessment and the information gathered from the survey as well as information gathered from follow-up discussions and meetings with the industry. The discussion on reformulation efforts is preceded by a brief discussion on present day formulations.

### A. Present Formulations

Aerosol adhesives are composed of active ingredients (eg. rubbers, resins, and additives), solvents, and propellants. The solvent and propellant portions of the formulations generally contain VOCs. Typical VOC solvents are aliphatic compounds such as pentane, hexane, cyclohexane, heptane, and aromatic compounds such as toluene and xylene. The survey results indicate that there are also a few alternative compounds presently being used in formulations. Acetone is by far the most popular of the exempt compounds. There are also about 30 products using methylene chloride, perchloroethylene or trichloroethylene. See Appendix E for more details on methylene chloride use. Water and parachlorobenzotrifluoride are also used in some aerosol adhesive formulations. The solvent content of aerosol adhesives range between 18 to 79 percent and average about 39 percent.

Typical VOC propellants are propane, butane, isobutane, and dimethyl ether. The propellants HFC-134a and HFC-152a are non-VOCs which are used in other consumer products. However, neither compound is currently being used in aerosol adhesive formulations. Propellant contents in aerosol adhesives range from 15 to 68 percent and average about 36 percent.

## B. Reformulation Options

The following is a discussion of the research and development portion of the 1998 Aerosol Adhesives Survey. The technologies are presented in the following order: solvents, propellants, high solids, and hardware modifications.

### Solvents

#### Water

Some manufacturers have pursued water-based technology. This technology offers advantages of reducing safety concern such as flammability, and lowering the VOC content.

Until recently, there has been one water-base product on the market since 1998. The manufacturer has reported several major problems associated with water-base formulations. The major problems are freeze thaw stability (solidifies in cold weather and does not revert back, even with vigorous agitation), and lengthy drying times. Because of the freeze thaw stability problem, the product must be manufactured, shipped, and stored in above freezing temperatures. In addition, the long drying times slow production for industrial users. Other problems reported by the manufacturer were poor adhesion to non-porous surfaces, wrinkling of paper, poor spray pattern, corrosion of unprimed or unpainted metals, and short shelf life. In addition, other manufacturers have reported problems with excessive foam and clogging of valves and actuators.

The manufacturer of the commercial product has recently announced that the product has been discontinued. The product had been sold primarily to users in non-ventilated work areas. The company has had to discontinue production because of poor performance, manufacture, and storage problems and the unavailability of key raw materials by the suppliers.

#### Methylene Chloride

Methylene chloride was reported to be a good, fast drying solvent and is compatible with most aerosol adhesive formulations. Methylene chloride is also a non-VOC. However, methylene chloride has been identified by the ARB as a toxic air contaminant. Furthermore, U.S. Occupational Safety and Health Administration (OSHA) has instituted workplace exposure limits and medical surveillance requirements for workers exposed to levels exceeding the specified exposure limits. The survey results show that a few manufacturers are currently using methylene chloride in their formulations. Of the eight products that meet the future 25 percent VOC standard seven are formulated with methylene chloride and one with water. Discussions with manufacturers indicate that products formulated with methylene chloride are generally older formulations that

are still in demand because of certain desirable characteristics such as faster drying time or low solvent soak in. Several manufacturers have stated that they would not pursue this solvent technology because of its toxicity and that many users have requested non-chlorinated products. Many products even advertise on the label "non-chlorinated." ARB staff is not considering the use of methylene chloride as a reformulation option.

### Acetone

Acetone is a fast drying solvent that has been widely used in aerosol adhesives. The ARB approved the exemption of acetone as a VOC due to its low reactivity (potential to form tropospheric ozone) on September 28, 1995.

The previous 1996 technical assessment determined that there were few formulations based on acetone substitution. At that time, several technical issues were reported: substrate attack, insufficient adhesion, misting, and a shortened shelf-life. However, the 1998 survey indicated that acetone is now by far the most widely used method of reducing the VOC content of the formulation. Table F-1 compares the number of products using acetone formulations to other product formulations. Some solvents listed in Table F-1 are combinations of two solvents: acetone/MeCl, water/acetone, water/TCE and MeCl/Perc.

**Table F-1: Distribution of Solvent Compositions**

Solvent*	Number
Acetone	76
Acetone/MeCl	3
Acetone/TCE	1
Water/Acetone	1
MeCl	26
MeCl/Perc	2
Perc	1
Water	1
All VOC	25

\*Methylene chloride and perchloroethylene, trichloroethylene are indicated by the abbreviations MeCl, Perc, and TCE.

Aerosol adhesive manufacturers reported that acetone is a good substitute for VOC solvents because it is readily available, reasonably priced, fast evaporating, and has an acceptable odor. However, formulators have experienced incompatibility with the rubbers/resins at high concentrations of acetone. In general, the maximum content of acetone tolerable in the solvent mixture is about 50 percent. We expect that many manufacturers will be able to further lower the VOC content of their aerosol adhesives by replacing some solvents with acetone. Of the products reported in the 1998 survey, acetone comprises about 20-60 percent of the solvent. However, some specialty products have typical acetone levels ranging from 60-90 percent of the solvent. The properties of acetone are summarized in Table F-2.

**Table F-2: Physical Properties of Acetone\***

Formula	CH <sub>3</sub> COCH <sub>3</sub>
Molecular Weight	58.1
Boiling Point, degrees F (C)	133 (56)
Vapor Pressure, mm Hg @ 20° C	185.5
Evaporation Rate, n-BuOAc=1	5.6
Density, g/cc @ 20° C	0.792
Kauri-Butanol Value	N/A
Surface Tension in Air: dynes/cm @ 20° C	22.3
Solubility parameter (cal/cm <sup>3</sup> ) <sup>1/2</sup>	10
Flash Point, TCC degrees F (C)	- 15 (-26)

\*Shell Chemical Company

Some manufacturers have reported that acetone in high concentrations produces characteristics that are unacceptable for some applications. One characteristic associated with acetone is its tendency to make a wetter bond. This is due to the absorption of atmospheric water in the acetone. As the acetone is rapidly volatilizing, the surrounding air is cooled, causing water to condense. The water is then absorbed in the acetone. This problem is critical in bonding porous materials requiring low soak-in. If the solvent soaks into the substrate, the adhesive is carried with the solvent below the surface, leaving less adhesive on the surface for bonding.

Another characteristic of acetone is its ability to dissolve polystyrene. Polystyrene is manufactured in several forms. Low density polystyrene (beadboard), such as that used in foam cups and packing material, can readily dissolve in acetone. High density polystyrene, known as Styrofoam<sup>®</sup>, is more resistant to acetone attack. Some manufacturers have formulated their products to minimize acetone attack by using less acetone. Others have modified their formulations by adding some slower evaporating components to protect the surface while the acetone is evaporating or by making the solvent fast evaporating to minimize surface contact time with the acetone. Also, allowing the surfaces to dry to a tack helps to allow acetone to evaporate before bonding. One product has instructions on the can advising users to hold the can a distance of 12 to 15 inches to allow time for the acetone to evaporate.

Methyl Acetate

Methyl acetate is a fast drying solvent and is considered an exempt compound. It has an evaporation rate and solvency similar to acetone, but differs in odor and other properties. The ARB approved the exemption of methyl acetate as a VOC due to its low reactivity in the atmosphere on November 19, 1998. Table F-3 shows the properties of methyl acetate.

**Table F-3: Physical Properties of Methyl Acetate\***

Formula	C <sub>3</sub> H <sub>6</sub> O <sub>2</sub>
Molecular Weight	74.09
Boiling Point, degrees F (C)	132 (56)
Vapor Pressure, mm Hg @ 20° C	171.3
Evaporation Rate, n-BuAc=1	5:3
Density, g/cc @ 20° C	0.93
Kauri-Butanol Value	N/A
Surface Tension in Air: dynes/cm @ 20° C	N/A
Solubility parameter (cal/cm <sup>3</sup> ) <sup>1/2</sup>	N/A
Flash Point, TCC degrees F (C)	9 (-13)

\* Eastman Chemical Company

Currently, methyl acetate is not used in aerosol adhesive formulations. Five manufacturers indicated that they have tested it. However, only two companies reported results in the detailed section of the survey. Two others reported that they plan to test methyl acetate. Manufacturers have reported that in general it behaves similarly to acetone, but it is more expensive (54¢/lb versus 14¢/lb). One manufacturer reported that the solubility is unacceptable and that it dries too slowly.

Parachlorobenzotrifluoride (PCBTF)

PCBTF (also known by the trade name Oxsol 100) is a solvent that is an exempt compound and has the potential to be used in modest amounts in aerosol adhesives. The physical properties of PCBTF are shown in Table F-4. The ARB

**TABLE F-4: Physical Properties of PCBTF\* (Oxsol 100\*\*)**

Formula	C <sub>7</sub> H <sub>4</sub> F <sub>3</sub> Cl
Molecular Weight	180.5
Boiling Point, degrees F 8	282 (139)
Vapor Pressure, mm Hg @ 20° C	5.3
Evaporation Rate, n-BuAc=1	0.9
Density, g/cc @ 20° C	1.34 -
Kauri-Butanol Value	64
Surface Tension in Air: dynes/cm @ 20° C	25
Solubility parameter (cal/cm <sup>3</sup> ) <sup>1/2</sup>	8.6
Flash Point, TCC degrees F 8	109 (43)

\* Occidental Chemical Corporation

\*\* Oxsol 100 is a registered trade name of the Occidental Chemical Corporation

approved the exemption of PCBTF as a VOC due to its low reactivity on September 28, 1995. In addition, PCBTF is not an ozone depleting substance or a federal hazardous air pollutant. PCBTF is used in non-aerosol coatings, inks, adhesives and other resin applications (Occidental Chemical). However, the staff is aware of just one aerosol adhesive product on the market that contains PCBTF.

Four manufacturers have indicated that they have tested PCBTF. Three companies reported results. One company reported that it has an offensive odor, slow dry time, and high price. Another manufacturer reported problems with the spray pattern. A third reported solubility problems.

The odor associated with PCBTF is similar to the odor associated with sanitizing agents and disinfectant sprays. However, masking agents are available that can be used to alter the natural aromatic odor of PCBTF. The drying time of PCBTF is slower than that of toluene, which is already considered to be a slow drying solvent. Therefore, PCBTF, if added, can be added only in limited amounts. In regards to costs, PCBTF costs \$1.70/lb. For comparison, toluene is about 12¢/lb. However, it is expected that it would be used in relatively small amounts

due to its slow dry time. In regards to solubility, PCBTF, being similar to toluene, is a good substitute for toluene. Unfortunately, there are only about 30 formulations that include toluene or xylene and the amount added is generally less than 5 percent of the total formulation. One manufacturer said that aromatics are not suitable for aerosol adhesives in large amounts because they are slow drying and because some aromatics are Proposition 65 compounds.

### Other Solvents

Staff also inquired about two other solvents: volatile methyl siloxanes (VMS) and t-butyl acetate. VMS fluids are low molecular weight silicone fluids. They are low in toxicity and almost odorless. The evaporation rates are on the same order as butyl acetate. In response to the survey, two companies indicated that they have tested VMS, and four companies responded in the detailed section of the survey. Of the companies that tested VMS, one responded that the evaporation rate is too slow, the solvent has poor solubility, and that it is expensive. The other company reported stability problems. The remaining companies basically had the same comments. However, one company had additional comments: high soak-in, and long term adhesion and durability problems.

Staff inquired about t-butyl acetate after the survey was mailed out. T-butyl acetate is not yet labeled as an exempt compound. However, it will be proposed for exemption by the ARB in the near future. One company responded that t-butyl acetate had poor solubility, was slow drying, and had an unacceptable odor. A second company had not conducted testing but responded based on general knowledge that it was slow drying, had an odor, and thought that, being an oxygenated compound, it would behave like acetone.

### **Propellants**

#### Hydrofluorocarbon-152a (HFC-152a)

HFC-152a (or Dymel 152a) is a non-VOC propellant that can be used in limited amounts to replace the hydrocarbon propellants currently used in aerosol adhesives. Also, unlike CFC's and HCFC's, HFC-152a is not an ozone-depleting substance. Table F-5, lists the properties of HFC-152a. The vapor pressure of this product is close to that of dimethyl ether, which is a commonly used

propellant in aerosol adhesives, and its low molecular weight means that a relatively small amount of product would produce an acceptable degree of atomization.

**TABLE F-5\*: Physical Properties of HFC-152a (Dymel 152a\*\*)**

Formula	CH <sub>3</sub> CHF <sub>2</sub>
Molecular Weight	66
Boiling Point, degrees F (C)	-13 (-25)
Vapor Pressure, psig (bar) @ 70° F (21° C)	63 (4)
Vapor pressure, psig (bar) @ 130° F (54° C)	177 (12)
Density, g/cc @ 70° F (21° C)	0.91
Kauri-Butanol Value	11
Flammability Limits in Air, vol. %	3.9 to 16.9
Flash Point, degrees F (C)	< -58 (< -50)

\* E.I. du Pont de Nemours and Company (Du Pont)

\*\* Dymel 152a is a registered trade name of E.I. du Pont de Nemours and Company

HFC-152a is not currently used in solvent-based aerosol adhesives. However, the one water-based formulation did use this propellant. HFC-152a is commonly used in other aerosol consumer products, such as hair care products. Seven manufacturers have indicated that they have tested HFC-152a. Six manufacturers have reported their findings. The biggest complaints were the cost and incompatibility with adhesive rubbers and resins. Two manufacturers reported problems with the spray pattern. One manufacturer commented that the hair spray industry has priority for allotments and that this may cause availability problems. One manufacturer reported that, for his products, HFC-152a can be used in small amounts (up to 15%) without sacrificing stability. Another manufacturer reported 4-5 percent substitution. One manufacturer also reported that, if acetone is in the formulation, then the percent acetone may need to be decreased to maintain stability. The manufacturer speculated that some products may achieve VOC levels of 55-60% when used in combination with acetone.

HFC-152a is more expensive than other propellants. HFC-152a costs \$1.85 per pound, compared with approximately 22¢ per pound for hydrocarbon propellants. HFC-152a, if used, would be added in limited quantities because of costs and solvency limitations.

### Compressed Gas Propellants

Compressed gas propellants such as carbon dioxide and nitrogen have been used successfully in aerosol products for many years, but have not yet been used in aerosol adhesives. Four manufacturers have indicated that they have tested the technology, and seven responded to the survey. The major concern is the lack of solubility of the gas in the mixture. Compressed gases are limited to the small headspace in the can. Because of the small amount of pressurized gas that can fit into the can, the spray pattern is inconsistent throughout the life of the product. Manufacturers also expressed other disadvantages of using compressed gases. Because these gases would comprise such a small percentage of the contents of the can, their presence would not lower the VOC much and they do not contribute much to drying the adhesive during delivery.

In contrast, liquefied hydrocarbon propellants provide a superior spray system. Because these propellants are miscible with the solvent and will vaporize to replenish the headspace as needed, the spray will remain constant throughout the life of the product. Also the vaporization of the propellant helps to break up the adhesive stream.

### **Other Technologies**

This section discusses high solids formulations and hardware modifications.

#### High-solids Formulations

Manufacturers can reduce the VOC content of their products by increasing the percent of solids (polymers and resins). Nine manufacturers have indicated that they have tested high-solids formulations. Seven have reported their findings. The majority reported minimal reductions in VOC, increased viscosity, and poor spray pattern. Manufacturers reported that increasing the solids content in conjunction with acetone substitution could reduce the VOC content in web sprays. One manufacturer has reported success in combining high solids with acetone and using patented hardware modifications. The company has reduced the VOC content in its formulation by over 10 percentage points and expects further reductions.

A potential advantage of high solids aerosol adhesives, beyond a reduction in VOC content, is that the increased adhesive solids level may allow more coverage. This is because more solids can potentially cover more surface area.

High solids products also have some potential disadvantages. Due to the high cost of polymers and resins, high solids formulations tend to cost more than conventional lower solids formulations. One manufacturer reported that the

solids cost 4 to 5 times more than the solvent. However, the cost per square footage may be less.

### Hardware Modifications

Modifications to the hardware can indirectly assist in lowering emissions by accommodating formulations with higher solids, improving transfer efficiency, or reducing the spray rate. Six manufacturers indicated that they have performed testing in this area. The responses indicated that the effects would be minimal. Only one manufacturer stated that hardware modifications would be used in conjunction with other technologies to achieve markedly lower VOC levels.

### **Achievable VOC Levels**

Based on the survey responses and on discussions with manufacturers, we have determined that manufacturers will not be able to meet the 25% VOC standard by January 1, 2002 unless they reformulate with methylene chloride. Originally, the 25% VOC standard was based on reformulating with water as the solvent. Manufacturers have not been able to formulate an acceptable water-based product. Staff has found that there are presently no other exempt compounds or solvents that can be used to lower the VOC content to 25 percent.

The U.S. EPA has received petitions to review many other solvents for consideration as exempt compounds. To qualify for exempt status a compound must meet low reactivity, low ozone depleting, and low toxicity standards. Manufacturers do not see any compound near exemption status that is suitable as a solvent in aerosol adhesives.

However, manufacturers have existing products and can reformulate to meet VOC levels lower than the existing 75% VOC standard. Based on the product survey, some products are at or below 60 percent VOC content. Some manufacturers have already taken the lead to optimize the reformulating options discussed earlier and there are indications that some improvement can be made for some products.

Manufacturers have stated that they can reformulate their products below the current 75% VOC standard using a combination of technologies. These include formulating with non-VOC or exempt compounds, increasing the solids content, and hardware modifications. Manufacturers anticipate that they can employ several of these reformulation methods, either alone or in combination, to achieve lower VOC levels. Specifically, these would include

- Replacing some of the solvents with acetone, methyl acetate, or perchlorobenzotrifluoride;
- Replacing some of the hydrocarbon propellant with hydrofluorocarbon-152a;

- Increasing the proportion of solids.
- Increasing the solvents at the expense of the propellants in order to increase the acetone level; and
- Developing new delivery systems.

In Chapter VI staff proposes the categories and limits shown in Table F-6. Staff believes that these limits are technologically and commercially feasible.

**Table F-6: Category Limits**

Product	Weight Percent VOC
Mist Sprays	65
Web Sprays	55
Special Purpose	
Mounting	70
Flexible Vinyl	70
Automotive Headliner	65
Expanded Polystyrene Foam	65
High Pressure Laminate	60
Polyolefins	60

Staff expects that the first two categories mist and web, will contain most of the products. Web sprays can achieve a lower VOC level than mist sprays because web sprays have a higher solids content. With a higher solids content, there is less room proportionately for VOC components in the formulation. There are presently no complying products for the web category, but industry believes that based on the ability of web sprays to take on a higher solids content, the 55 percent level can be achieved with further increases in the solids level and increased acetone substitution. Since acetone can generally be substituted up to approximately 50% of the solvent content, the ratio of the propellants/solvents can be modified to allow a higher acetone content. Mist sprays, on the other hand, have a lower solids/solvent ratio to maintain the mist spray pattern. The higher level of solvents results in higher VOC levels. The limit 65 percent reflects this.

The remaining categories all fall under the special purpose category. These products are used for sensitive substrates, demanding applications such as high strength or high heat, or substrates that are difficult to bond. In some cases, these substrates are sensitive to acetone attack. In other cases, these applications may require the use of special rubbers that are difficult to dissolve in acetone. An aerosol adhesive is a complex mixture of components that must remain dispersed or in solution in order to be effectively applied. Acetone

substitution, which is the major method of lowering VOC, is not as effective for products formulated primarily for special purpose applications.

The applications in the 70 percent category are composed of flexible vinyl and mounting adhesives. There is presently only one product that staff is aware of that is designed primarily for vinyls. This is a neoprene adhesive, which is very difficult to solubilize. There are other products that can be used on unsupported vinyl (vinyl with cloth backing). Nevertheless, manufacturers claim that plasticizers can still migrate from the vinyl to the adhesive. Adhesives that are resistant to plasticizers have a higher molecular weight. These rubbers are less soluble in solvents and will require a higher solvent/rubber ratio, thus a higher VOC. There are two mounting adhesives that are widely used for professional mounting by framing shops. The adhesives are marketed for permanently bonding posters and prints to a backing without causing discoloration. These products cannot be reformulated to levels below 70 percent VOC because of potential harm to the substrate. Therefore, to ensure the availability of aerosol adhesives for mounting, the limit was set at 70 percent VOC.

The applications in the 65 percent category are composed of headliners and polystyrene foam. Headliners require a high strength, high temperature contact adhesive. These products are made from styrene-butadiene rubbers, which are difficult to solubilize. Manufacturers need flexibility in solvent selection. The other application, polystyrene foam, is sensitive to substrate attack by acetone. Although the severity of acetone attack can be minimized by proper application, the homeowner does not always read the label carefully. Misapplication can severely damage polystyrene. Also, there are times when a heavier film needs to be applied for added strength. If too much adhesive is applied over the same area too quickly, the acetone may sit on the surface long enough to attack the foam. Manufacturers are concerned about product liability and therefore need to restrict acetone use in the formulation to allow the product to be more forgiving.

The applications in the 60 percent category are composed of high-pressure laminate bonding and polyethylene sheeting. High pressure laminate comes in thin, tightly rolled sheets. High strength, quick bonding spray adhesives are generally used for bonding high-pressure laminate because of the tendency of the sheet to curl while it is bonding to the wooden surface. Web spray contact adhesives are usually marketed for this application. There are currently a couple of products available at around 60 percent VOC. Manufacturers are uncertain whether they can formulate a 55 percent VOC product by 2002. Therefore, the limit is based on a level of 60 percent to ensure that complying products will be available by 2002.

Polyolefins have very low energy, and, therefore, have little to no attraction for anything to which they come in contact with. Adhesives used for polyolefins serve an important function in containing asbestos dust during demolition. There are currently a few products available at 60 percent VOC. Manufacturers are

uncertain whether they can formulate a 55 percent product by 2002. Therefore, the limit is based on a level of 60 percent to ensure that complying products will be available by 2002.



**APPENDIX G: HEALTH RISK AND NEEDS ASSESSMENT OF  
METHYLENE CHLORIDE, PERCHLOROETHYLENE, AND  
TRICHLOROETHYLENE**



## **Health Risk and Needs Assessment for Prohibiting Methylene Chloride, Perchloroethylene and Trichloroethylene in Aerosol Adhesive Products**

As discussed in Chapter VI of the Staff Report, methylene chloride (MeCl), perchloroethylene (Perc), and trichloroethylene (TCE) are only used in a small number of aerosol adhesive products. Therefore, the overall exposure to aerosol adhesives containing MeCl, Perc, or TCE is expected to be small. However, given the fact that the three compounds are toxic, and used in numerous other consumer products and industrial processes, staff believes that the proposed prohibition on their use in aerosol adhesives would reduce the overall cumulative exposure and risk from these many sources. This appendix describes staff's assessment of the health risk due to the use of MeCl, Perc and TCE in aerosol adhesives and the need to reduce exposure to these compounds.

### **A. Overview**

Under the California Toxic Air Contaminant (TAC) Identification and Control Program, established under Assembly Bill 1807, the ARB has authority to identify and control TACs. This involves a two step process, in which compounds are first identified as a TAC through a formal process, and then subsequently controlled to lower the risk of exposure to the public. Proposed TAC controls require the preparation of a risk and needs assessment.

The Board identified MeCl as a TAC at a Board hearing held in July 1989. The details of staff's evaluation is contained within the ARB staff report, "Staff Report: Proposed Identification of Methylene Chloride as a Toxic Air Contaminant", dated May 1989. In October 1990, the Board identified trichloroethylene as a TAC. The technical evaluation is contained in the ARB staff report, "Staff Report: Proposed Identification of Trichloroethylene as a Toxic Air Contaminant", dated August 1990. Also, in October 1991, the Board identified perchloroethylene as a TAC. The complete analysis for Perc is contained within the ARB staff report, "Initial Statement of Reasons for Rulemaking: Proposed Identification of Perchloroethylene as a Toxic Air Contaminant", dated August 1991

Based on recommendations from the Department of Health Services and on corroboration from the Scientific Review Panel and the Office of Environmental Health Hazard Assessment (OEHHA), the Board determined that all three compounds are probable human carcinogens and insufficient data existed to establish minimum threshold levels, below which there are no adverse health effects.

For TACs that have no identified minimum threshold levels, the Health and Safety Code (HSC) section 39666(c) requires that those TACs be controlled to the lowest achievable level using best available control technology (BACT). The

HSC Section 39665 requires that an assessment of the public health needs be prepared, to the extent information is available, for a given TAC to show:

1. rate and extent of identified TAC emissions, estimated human exposure, and risks associated with those levels
2. the stability, persistence, transformation products, dispersion potential and other chemical characteristics of the TAC substance when present in ambient air
3. the categories, numbers, and relative contribution of present and future sources of the TAC, including mobile, industrial, agricultural, and natural sources
4. TAC control measure technological feasibility, anticipated effect of the proposed airborne toxic control measure, the degree to which the proposed airborne toxic control measure is compatible with recent technological improvements, or other actions taken in the past to reduce emissions
5. the approximate control cost, magnitude of risks as reflected by the amount of emissions from the source or category of sources, and the reduction in risk attributed to the airborne toxic control measure
6. the availability, suitability and relative efficacy of other substitute compounds of a less hazardous nature.
7. Potential adverse health, safety, or environmental impacts that may occur as a result of implementation of the toxic control measure.
8. Any basis for finding that an existing control measure does not achieve the expected emissions reductions (if necessary)

MeCl, Perc and TCE were previously evaluated during the TAC identification process for human exposure, potential cancer risk, chemical persistence in the atmosphere, and potential sources of these toxic compounds as referenced in the earlier discussion on the identification of those TACs. As indicated above, no minimum acceptable exposure levels were identified for these toxic compounds.

A discussion of the technological feasibility of the proposal to prohibit MeCl, Perc, and TCE in aerosol adhesives is contained in Chapter VI and Appendix F. In Appendix F, staff discusses potential substitute compounds for aerosol adhesives that are less hazardous. Costs associated with the proposed prohibition are discussed in Chapter VIII of this Staff Report, and environmental impacts are discussed in Chapter VII.

To complete the needs assessment to prohibit MeCl, Perc, and TCE (as required by HSC sect. 39665) in aerosol adhesives, this appendix addresses potential sources, potential health effects, dose-response values, exposure assessments, and risk characterizations for these three TACs. To evaluate exposure and risk, staff performed an assessment of worker exposure and estimated public risk due to the use of aerosol adhesives containing MeCl, Perc, and TCE.

To determine health impact of the three TACs, we considered the breathing or inhalation pathway only. We are not evaluating other routes of exposure because at this time the OEHHA does not routinely use other pathway exposures for volatile compounds such as MeCl, Perc, and TCE. Inhalation is the primary route of exposure for these compounds found in aerosol adhesives.

## **B. Sources of MeCl, Perc, and TCE**

The 1998 aerosol adhesive product survey showed that 33 out of 136 aerosol adhesive products were formulated with MeCl, Perc or TCE. Of this group, 29 products were formulated with MeCl alone in concentrations ranging from 13 to 73 wt%. In the past, aerosol manufacturers have favored MeCl because it is considered an excellent solvent with low flammability and low boiling point. These desirable properties have led to more widespread use of MeCl, than Perc or TCE. The 1998 product survey identified three products containing Perc, and only one product containing TCE. Together, these 33 products accounted for about three percent of total aerosol adhesive product sales.

The aerosol adhesive products containing MeCl, Perc and TCE were categorized by staff according to their use. Multipurpose adhesives represented the largest amount of sales, but actual uses of this general category of aerosol adhesives is difficult to determine. Upholstery and fabric adhesives represented the largest amount of sales for a specific purpose, whereas, aerosol adhesives used for silk screening applications represented the second major specific use of aerosol adhesives. Other uses of these aerosol adhesives included laminate table top installation and artist/advertising applications.

As previously mentioned, numerous consumer and industrial products, other than aerosol adhesives, contain MeCl, Perc, or TCE. For instance, all three TACs are used in paint and coating products. MeCl is also used in many paint remover products.

MeCl, Perc and TCE are also used in many industrial applications as well. The ARB has estimated that 80 percent of statewide Perc emissions are derived from dry cleaning and degreasing operations. TCE is almost exclusively emitted from industrial metal part degreasing operations. MeCl is used in the manufacturing of polyurethane and pesticides, as well as in certain pharmaceutical and electronics applications.

## **C. Potential Health Effects**

This section summarizes the cancer and non-cancer impacts that can result from exposure to MeCl, Perc, and TCE.

## 1. Methylene Chloride

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.

### a. 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 the International Agency for Research on Cancer (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 toxic air contaminant (TAC) in July 1989. The State of California under Proposition 65 listed MeCl as a carcinogen in April 1988. Table G-1 presents the current health effects values that are used in this health risk assessment (HRA) for determining the potential health impacts.

In 1990, the U.S. Congress listed MeCl 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 MeCl in Group B2, as a probable human carcinogen. The IARC has classified MeCl in Group 2B, as a possible human carcinogen.

### b. 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.

The California Air Pollution Control Officer's Association (CAPCOA) and OEHHA listed MeCl as having acute and chronic non-cancer RELs. The U.S. EPA also 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). Table G-1 presents the current health effects values that are used in this HRA for determining the 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.

**Table G-1**  
**Health Effects Values Used for Determining Potential Health Impacts <sup>1</sup>**

Compound	Cancer Unit Risk Factor (ug/m3) <sup>-1</sup>	Non-cancer Reference Exposure Levels (ug/m3)		Toxicological Endpoints	
		Acute	Chronic	Acute	Chronic
Perchloroethylene (Perc)	5.9 E-6	20,000	35	central nervous system; eye & respiratory irritation	kidney; liver and gastrointestinal system
Methylene Chloride (MeCl)	1.0 E-6	14,000	3000	central nervous system	central or peripheral nervous system; liver and gastrointestinal system
Trichloroethylene (TCE)	2.0 E-6	none	640	None	central or peripheral nervous system; liver and gastrointestinal system

1. Health effects values and toxicological endpoints were obtained from three sources:

- A) California Air Pollution Control Officer's Association, Air Toxics Hot Spots Program, Revised 1992 Risk Assessment Guidelines, October 1993.
- B) Office of Environmental Health Hazard Assessment, Air Toxic Hot Spots Program Risk Assessment Guidelines, Part II, Technical Support Document for Describing Available Cancer Potency Factors, April 1999.
- C) Office of Environmental Health Hazard Assessment, Air Toxic Hot Spots Program Risk Assessment Guidelines, Part I, The Determination of Acute Reference Exposure Levels for Airborne Toxicants.

## 2. Perchloroethylene

Exposure to Perc may result in both cancer and non-cancer health effects. The probable route of human exposure to Perc is inhalation.

### a. Cancer

The 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. The State of California under Proposition 65 listed Perc as a carcinogen in April 1988. Table G-1 presents the current health effects values that are used in this HRA for determining the potential health impacts.

In 1990, the U.S. Congress listed Perc 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 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 IARC has classified Perc in Group 2A, as a probable human carcinogen, based on sufficient evidence in animals and limited evidence in humans.

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.

b. Non-Cancer

Acute and 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. 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.

In addition to CAPCOA and OEHHA listing Perc as having acute and chronic non-cancer RELs, 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. Table G-1 presents the current health effects values that are used in this HRA for determining 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 of 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.

3. Trichloroethylene

Exposure to Trichloroethylene (TCE) may result in both cancer and non-cancer health effects. The probable routes of human exposure to TCE are inhalation and ingestion.

a. 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. The State of California under Proposition 65 listed TCE as a carcinogen in April 1988. Table G-1 presents the current health effects values that are used in this HRA for determining the 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 IARC classified TCE in Group 2A, as a probable human carcinogen, based on sufficient evidence in animals and limited evidence in humans.

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.

b. Non-Cancer

Acute and chronic exposure to TCE may result in non-cancer health effects. TCE is a central nervous system depressant and has been used as an anesthetic. It is mildly irritating to the eyes and respiratory tract. Occupational exposure to TCE has resulted in nausea, headache, loss of appetite, weakness, dizziness, ataxia, and tremors. Acute exposures to high concentrations has caused irreversible cardiac arrhythmias, nerve and liver damage and death. Chronic exposure to TCE has also been shown to cause respiratory irritation, renal toxicity, and immune system depression. Alcohol consumption in humans increases the toxicity of TCE and causes "degreaser's flush", which are red blotches on the skin.

A chronic non-cancer REL is listed in the CAPCOA, Revised 1992, Risk Assessment Guidelines, October 1993. Table G-1 presents the current health effects values that are used in this HRA for determining the potential health impacts. The U.S. EPA currently is reviewing the Reference Concentration (RfC) and the oral Reference Dose (RfD) for TCE.

#### D. Dose-Response Values

Dose-response or pollutant-specific health effects values are developed to characterize the relationship between a person's exposure to a pollutant 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.

As presented earlier in section B of this appendix, exposure to Perc, MeCl, and TCE may result in both cancer and non-cancer health effects. The inhalation URFs and non-cancer acute and chronic RELs that are used for this evaluation are listed in Table G-1. Also included in Table G-1 are the non-cancer acute and chronic toxicological endpoints for Perc, MeCl, and TCE. During this assessment, new acute RELs were adopted by OEHHA for Perc and MeCl. Table G-1 reflects the most current OEHHA-adopted health effects values for these compounds. The acute impacts presented in the June 1997 Status Report or Needs Assessment used the previous acute REL for Perc. In that report, the acute non-cancer results were all reported to be less than a hazard index of 1.0. 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. Since the current acute Perc REL is 2.94 times higher than the previous REL and it is used as a denominator in non-cancer hazard index calculations, the net result of the current REL, if it were applied to the results presented in the 1997 Needs Assessment, would show a decrease in the acute hazard indices by a factor of 2.94. Currently, OEHHA is in the process of reviewing studies for developing new or updating existing chronic RELs. MeCl and TCE are among the compounds under review. Once the chronic RELs are adopted by OEHHA, they may be used in HRAs.

A URF is defined as the estimated upper-confidence limit (usually 95%) probability of a person contracting cancer as a result of constant exposure to a concentration of  $1 \text{ ug/m}^3$  over a 70-year lifetime. In other words, using the URF for Perc as an example, which is  $5.9 \times 10^{-6}$  (microgram per cubic meter)<sup>-1</sup> or  $(\text{ug/m}^3)^{-1}$ , the potential excess cancer risk for a person continuously exposed over a 70-year lifetime to  $1 \text{ ug/m}^3$  of Perc is estimated to be no greater than 5.9 chances in 1 million.

An REL is used as an indicator of potential non-cancer adverse health effects. An REL 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.

#### **E. Worker Exposure Assessment**

To assess worker exposure, staff used the emissions model that was used to calculate exposure levels of perchloroethylene from brake cleaner aerosol products. This analysis may be found in the ARB report, "Initial Statement of Reasons for Proposed Amendments to the California Regulations for Reducing Volatile Organic Compound Emissions From Consumer Products and Aerosol Coating Products", October 1996. Staff used this model as a surrogate since the use of aerosol adhesives and the facilities where these products are applied can be similar. Staff believes that the assumptions used in the model represent a worst case scenario.

From the 1998 aerosol adhesives survey, staff found that a predominant amount of spray adhesives containing MeCl and Perc are used in paper bonding, silk screening, and upholstery applications. In addition to MeCl and Perc, a limited amount of TCE was used in one aerosol adhesive product. This product contained about 30 percent TCE, and accounted for about 1 percent of the total sales in the special purpose aerosol adhesives category. Staff believes that based on the relative little use of this product, the exposure to TCE from aerosol adhesive products would be significantly less than the exposure to MeCl and Perc. Therefore, staff did not conduct an exposure assessment on TCE.

For the types of applications these products can be used, staff determined that upholstery operations best represented the largest use of these products. Therefore, upholstery operations were evaluated to determine workplace exposure to Perc and MeCl. Products containing MeCl, or a combination of MeCl plus Perc, were addressed because some aerosol adhesives contained one or both of these compounds in their formulations.

To estimate exposure to MeCl, staff evaluated upholstery operations, which are performed in an enclosed shop. A mathematical emissions model was used to relate the time-weighted concentration of MeCl in a typical upholstery shop during an 8-hour work day. The range of MeCl present in upholstery aerosol adhesives ranges from 34.5% to 53.5%.

As mentioned above, the mathematical model was previously used for calculating perchloroethylene exposure from brake cleaners, and can be used to assess the exposure of MeCl, taking into account its molecular weight and its emission rate.

For estimating the MeCl concentration, the equation is:

$$C_{\text{MeCl}} = \frac{(24.45 \times 10^{-3} \text{ m}^3/\text{mol}) (A)(B) \times 10^6}{(M)(V)(1+D)} \quad \text{where,}$$

- $C_{\text{MeCl}}$ - Estimated room concentration of methylene chloride, ppm  
 A- Worst Case MeCl content per can, grams/can (304 gm/can)  
**MeCl/20 oz. can=> 196 gm/can – 304 gm/can (34.5% - 53.5% MeCl )**  
 B- Number of cans used per work period (1 can per 8 hr. work period)  
 M- Molecular weight of methylene chloride- $\text{CH}_2\text{Cl}_2$  (84 gm/mol)  
 V- Shop volume,  $\text{m}^3$  (1874  $\text{m}^3$ -Aerosol Coatings ISOR 10/96)  
 D- Shop volume changes per work period (48 changes/work period)

Staff used the same assumptions for shop volume and shop air flow used in the evaluation of brake cleaning operations since upholstery shops can be similar in size and use. Using the parameters for upholstery shops into the equation above, the localized concentration in the shop was calculated to be:

$$C_{\text{MeCl}} = 0.97 \text{ ppm, for the worst case application (20 oz. can)}$$

This compares to the MeCl federal OSHA time weighted exposure limit of 25 ppm per 8-hr work day

*Products Containing Both Perc and MeCl:*

A few products reported in the 1998 product survey contained both Perc and MeCl in their formulations. One product reported in the 1998 product survey contained 28% Perc and 24% MeCl.

By assuming the same upholstery operations and using the equation above, the concentration for Perc is calculated to be:

$$C_{\text{Perc}} = \frac{(24.45 \times 10^{-3} \text{ m}^3/\text{mol}) (A)(B) \times 10^6}{(M)(V)(1+D)} \quad \text{where,}$$

- $C_{\text{Perc}}$ - Estimated room concentration of Perc, ppm  
 A- Worst Case Perc content per can, grams/can (159 gm/can)  
**Perc/20 oz. can=> 159 gm/can (28% Perc formulation)**  
 B- Number of cans used per work period (1 can per 8 hr. work period)  
 M- Molecular weight of Perc (165.8 gm/mol)  
 V- Shop volume,  $\text{m}^3$  (1874  $\text{m}^3$ -Aerosol Coatings ISOR 10/96)  
 D- Shop volume changes per work period (48 changes/work period)

Perc →  $C_{\text{Perc}} = 0.26 \text{ ppm, for the worst case application (20 oz. can)}$

This compares with the Perc federal OSHA time weighted exposure limit of 100 ppm per 8-hr work day

The concentration of the MeCl portion of the product containing 28% Perc and 24% is calculated:

$$\text{MeCl} \rightarrow C_{\text{MeCl}} = 0.43 \text{ ppm}$$

Again, this compares to the MeCl federal OSHA time-weighted exposure limit of 25 ppm per 8-hr workday.

Staff also calculated the worker exposure due to the only TCE containing product reported in the 1998 product survey. The results indicated that the exposure level to TCE was more than two orders of magnitude lower than the current federal OSHA standard of 100 ppm (8-hr time weighted avg).

## F. Risk Assessment

As pointed out in sections C and D of this appendix, MeCl, Perc, and TCE are probable human carcinogens, with no identified threshold levels below which there is no carcinogenic effects. These TACs are commonly used in numerous consumer products and industrial processes. Therefore, the proposed prohibition on the use of MeCl, Perc, and TCE in aerosol adhesives would incrementally reduce long term and short term exposure and risk from these compounds.

To assess the potential health risks of aerosol adhesives, staff modeled their evaluation on a recent ARB analysis to assess the health risk of aerosol brake cleaners (ARB Staff Report, "ISOR for Proposed Airborne Toxic Control Measure for Emissions of Chlorinated Toxic Air Contaminants from Automotive Maintenance and Repair Activities," March 2000). Again, upholstery shops and brake shops can be very similar and both have similar environmental factors (e.g. shop size, product use, etc.).

Please note that staff's objective in this assessment was to establish that potential risks exists from the use of aerosol adhesives which contain these TACs, rather than bracketing the actual risks from these facilities. Staff believes that the assumptions used in this model represents worst case conditions.

Table G-2 contains staff's estimates for exposure and risk from aerosol adhesives containing MeCl and Perc. As shown in table G-2, cancer risk for MeCl ranges from 0.2 chances in a million to about 6 in a million, depending on the distance from the source. For the combined product using MeCl and Perc, the cancer risk ranges from 3 in a million to about 30 in a million (cancer risk of MeCl plus risk of Perc), again depending on distance. The highest annual average concentration and risk occurs nearest the source, while the lowest exposure and risk occurs farthest from the source. Therefore, actual risk is dependent on receptor location. In conducting this assessment, staff did not

Table G-2

TAC	Ann Avg. Exposure (ug/m <sup>3</sup> )		URF (ug/m <sup>3</sup> )	Cancer Risk (chance/10 <sup>6</sup> )	
	@ 20M	@150 M		@ 20 M	@150 M
<i>Products w/ MeCl Only:</i>					
MeCl Only	438	12.8	1.0X10-6	5.8	0.16
<i>Products w/Perc&amp;MeCl:</i>					
Perc Portion	132	14.5	5.9x10-6	26.6	2.7
MeCl Portion	219	6.4	1.0X10-6	2.9	0.08

evaluate possible receptor locations or population density in locations near upholstery facilities. It should be noted that the estimated exposure and risk from this assessment could be several factors lower if more typical assumptions were used in the model.

#### G. Rationale for Reducing Exposure to MeCl, Perc, and TCE

As indicated in the previous section, possible exposure to MeCl, Perc, and TCE can exist from the use of aerosol adhesives. These compounds are toxic compounds and are considered probable human carcinogens.

In addition to aerosol adhesives, MeCl, Perc, and TCE are found in numerous other consumer and industrial products, and used in industrial processes. Although exposure and risk to these TACs are likely to be small from a single source, the cumulative exposure from many sources could be significant. Staff believes by eliminating the use of these TACs in aerosol adhesives, overall exposure and risk to these TACs would be reduced.