

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.

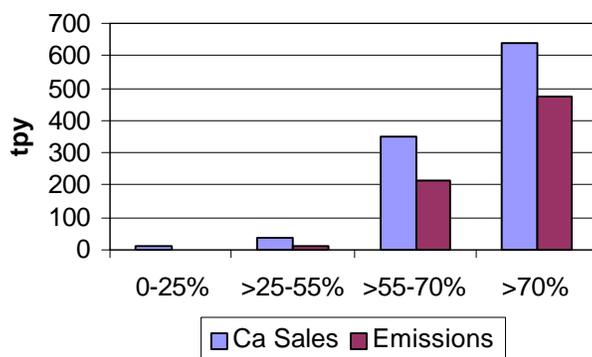
After compiling the survey results, staff compiled summaries showing company and product listings, the breakdown of sales and emissions by adhesive type, and VOC ranges and averages. Sales and emissions data are summarized in the following section. The research and development data are discussed in Appendix 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
Total	1039	703

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>$\frac{MeCl}{VOC}$</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

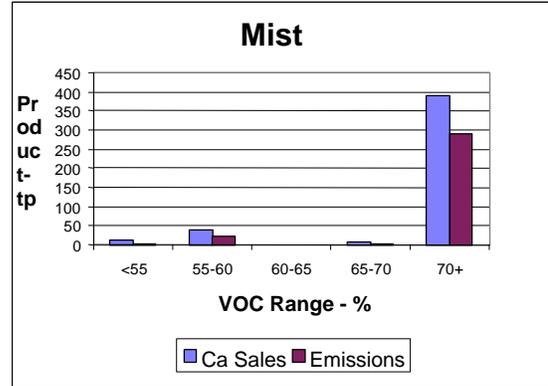
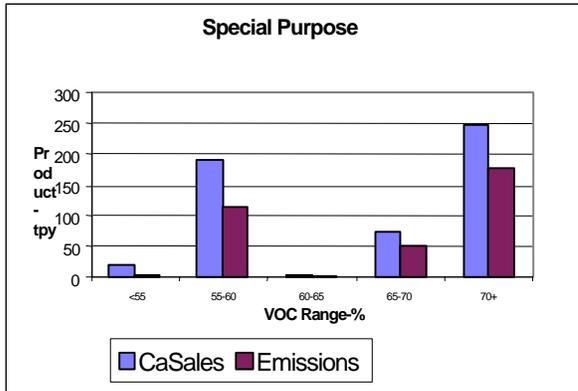
	Number	Sales (tpy)	Emissions (tpy)	VOC Range (%)	Wt-Avg VOC
<i>Without MeCl/PercTCE*</i>					
Mist	25	444	321	29-92	72
Web	13	41.1	26.4	43-95	64
Special Purpose	65	519	344	0-89	66
<i>With MeCl/Perc/TCE</i>					
Mist	10	1.9	0.6	19-44	29
Web	7	15.3	4.8	21-40	30
Special Purpose	16	17.1	6.0	26-75	35

* Methylene chloride, perchloroethylene, and trichloroethylene are abbreviated as follows: MeCl, Perc, and TCE.

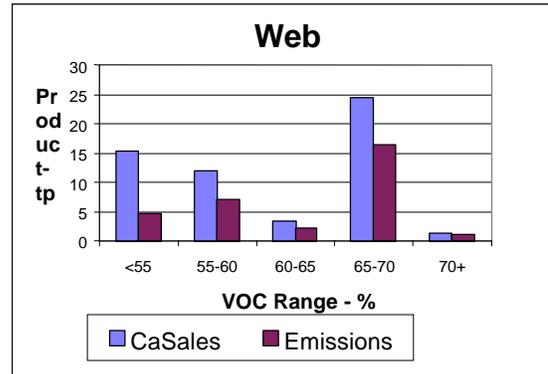
perchloroethylene, and trichloroethylene. Note that there are only 33 products formulated with methylene chloride, perchloroethylene, or trichloroethylene. Sales of these products comprise about 3 percent of the total sales.

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

Attachment 1 (Continued)

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)

Company Name	Product Name
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 Adhesi
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

Attachment 2: Product Composition

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.