

**The State of New Jersey
Department of Environmental Protection**

**ESTIMATED VOC EMISSION REDUCTIONS
AND
ECONOMIC IMPACT ANALYSIS**

FOR

**PROPOSED AMENDMENTS TO CHEMICALLY
FORMULATED CONSUMER PRODUCTS**

July 3, 2003

I. INTRODUCTION

The Department is proposing amendments to its consumer products rules as discussed in the rule amendment proposal. This document provides additional details on the estimated volatile organic compound (VOC) emission reductions and the economic impact analysis for the rule amendments.

II. ESTIMATED VOC EMISSION REDUCTIONS

Introduction

The New Jersey proposed rules and amendments for chemically formulated consumer products (CFCPs) are based on the Ozone Transport Commission (OTC) model rule for consumer products (chemically formulated), which in turn is based on the California Air Resources Board (CARB) rules and background data. The technical basis for the proposed VOC content limits lies within the framework that the CARB developed for its consumer products rules. Significant technical documentation was developed as part of the CARB process.

Two related rules currently exist regarding CFCPs in New Jersey, an existing New Jersey rule (N.J.A.C. 7:27-24) and a USEPA Federal rule (40 CFR § § 59.201 to 59.214). The proposed rules and amendments are more stringent than either of these. The existing New Jersey rule became effective in November 1995 (the VOC limits became effective in April of 1996) and regulates 23 product categories. The Federal rule became effective in September 1998 and regulates 25 product categories. The Federal rule regulates automotive windshield washer fluids and charcoal lighter materials, while the New Jersey rule does not. Over half of the emissions in the CFCPs VOC emission inventory (as defined by the USEPA) were not regulated by the

existing New Jersey rule or Federal rule.

The proposed rule amendments regulate 45 consumer product categories. Twenty-one of these categories (42 sub-categories) were not included in the Federal rule. Fourteen categories have more stringent limits than the Federal rule. Some of the more stringent limits are currently in effect in California, while others have future effective dates in California.

In the New Jersey 1996 Emission Inventory, VOC emissions from CFCs were estimated to be approximately 80 tons per day, on a typical summer day. This estimate of the daily emissions was calculated using USEPA guidance. These emissions represent approximately 26 percent of the VOC emissions from area sources in the inventory and approximately 8 percent of the total man-made VOC emissions in the inventory. For additional details on the derivation of these estimates see the "NJDEP State Implementation Plan Revision for the Attainment and Maintenance of the Ozone National Ambient Air Quality Standard, 1996 Actual Emission Inventory and Rate of Progress Plans for 2002, 2005 and 2007," dated March 31, 2001. This report may be downloaded from the Department's website at <http://www.state.nj.us/dep/baqp/sip/siprevs.htm> or obtained by telephoning (609) 633-0530.

Data Sources, Assumptions and Calculations

The estimated emission reductions were calculated using data from the CARB staff

reports and surveys¹ and data from the USEPA 1990 consumer products survey and report.²

CARB conducted consumer product survey's in 1990, 1994/1995, and 1997 and utilized anti-perspirant/deodorant data from 1993 from required reporting of these categories.

The CARB data was used to calculate a percent VOC emission reduction of the CFCP categories being regulated and the entire CFCPs inventory. VOC emissions and emission reductions were estimated for each individual product category proposed for regulation using CARB data and adjusting it for New Jersey population. The estimated VOC emissions and emission reductions were summed for the product categories being regulated. These totals were compared to estimated emissions for the entire CFCPs inventory to calculate a percentage reduction of the inventory.

Results

The estimated reduction of VOC emissions for the CFCPs inventory was calculated to be 14.2 percent. As part of the regional effort to address the 1-hour ozone additional reduction requirements, the OTC commissioned a study to quantify the reduction benefits of the six rules

¹ CARB, "A Proposed Regulation to Reduce Volatile Organic Compound Emissions From Antiperspirants and Deodorant", September 1989

CARB, "Proposed Regulation To Reduce Volatile Organic Compound Emissions From Consumer Products", Staff Report, August 1990

CARB, "Proposed Amendments to the Statewide Regulation to Reduce Volatile Organic Compound Emissions From Consumer Products, Phase II", October 1991

CARB, "Initial Statement of Reasons for Proposed Amendments to the California Regulations For Reducing Volatile Organic Compound Emissions From Anti-perspirants and Deodorants, Consumer Products and Aerosol Coatings", August 11, 1995

CARB, "Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation", June 6, 1997

CARB, "Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation", September 10, 1999

² USEPA, "Study of Volatile Organic Compound Emissions From Consumer and Commercial Products", Report to Congress, March 1995

being prepared for use on a regional basis.³ This estimated reduction calculation was used in the study to calculate projected VOC emission reductions for the region. The calculations were later updated to reflect changes in aerosol anti-perspirant and deodorant limits in California. The results of the analysis are shown in Table 1.

³ E.H. Pechan and Associates, Inc., "Control Measure Development Support Analysis of Ozone Transport Commission Model Rules," March 31, 2001.

Table 1 Estimated VOC Emission Reductions for Chemically Formulated Consumer Products Based on Proposed Amendments To N.J.A.C. 7:27- 24							
Consumer Products Category		Estimated VOC Reductions based on USEPA and CARB Survey's (1)(2)			Estimated VOC Reductions based on CARB Survey		
		2000 VOC Emission (tpd)	2000 Emission Reduction (tpd)	Percent Emission Reduction	2000 VOC Emission (tpd)	2000 Emission Reduction (tpd)	Percent Emission Reduction
Adhesives	Aerosols	0.11	0.02	16	0.11	0.02	16
	Construction and panel	0.25	0.11	44	0.25	0.11	44
Air fresheners	Single-phase	0.52	0.30	57	0.15	0.06	40
	Double-phase	1.16	0.39	34	1.16	0.39	34
Automotive Brake Cleaners	aerosols	1.34	0.08	6	1.34	0.08	6
	Non-aerosols	0.09	0.01	6	0.09	0.01	6
Automotive Rubbing or Polishing Compounds		0.26	0.09	33	0.26	0.09	33
Automotive Wax/Polish/Sealant/Glaze	Hard paste waxes	0.17	0.06	36	0.17	0.06	36
	All other forms	0.50	0.17	35	0.50	0.17	35
Bug and Tar Remover		0.21	0.08	40	0.21	0.08	40
Carburetor and choke cleaners (or fuel-injection air intake cleaners)	aerosols	1.59	0.54	34	1.59	0.54	34
	Non-aerosols	0.06	0.01	22	0.06	0.01	22
Carpet and Upholstery Cleaner	aerosols	0.07	0.01	14	0.07	0.01	14
	non-aerosols (dilutables)	0.15	0.09	59	0.15	0.09	59
	non-aerosols (ready-to use)	0.04	0.01	33	0.04	0.01	33
Dusting Aids	Aerosols	0.01	0.00	29	0.12	0.03	25
	All other forms						
Engine degreasers		0.20	0.07	33	0.98	0.25	26
	Aerosols	0.42	0.09	22	0.42	0.09	22
	Non-aerosols	0.02	0.01	63	0.02	0.01	63
Fabric protectants		0.07	0.01	20	0.07	0.01	20
Floor Wax Stripper		0.85	0.46	54	0.85	0.46	54
Furniture maintenance products	aerosol	0.50	0.09	18	0.50	0.09	18
	all other forms (except solid/paste forms)	0.10	0.03	33	0.10	0.03	33
General purpose cleaners	Non-aerosols (dilutables)	1.21	0.11	9	1.21	0.11	9
	Non-aerosols (ready-to use)	0.81	0.27	33	0.81	0.27	33
General purpose degreasers	aerosols	0.15	0.07	46	0.15	0.07	46
	Non-aerosols (dilutables)	0.28	0.11	38	0.28	0.11	38
	Non-aerosols (ready-to use)	0.24	0.04	16	0.24	0.04	16
Glass cleaners	All other forms	0.63	0.17	27	0.63	0.17	27
	Non-aerosols (dilutables)	0.31	0.21	68	0.31	0.21	68
	Non-aerosols (ready-to use)	0.58	0.09	16	0.58	0.09	16
Hair Shine		0.15	0.06	42	0.15	0.06	42
Hairsprays		12.75	3.98	31	10.64	2.77	26
Hair mousses		0.19	0.08	43	0.19	0.08	43
Heavy-duty Hand Cleaners or Soap		0.78	0.60	76	0.78	0.60	76
Insecticides	Crawling bug	0.61	0.30	50	0.49	0.21	44
	aerosol crawling bug	0.97	0.13	13	0.97	0.13	13
	aerosol flying bug	0.15	0.03	18	0.15	0.03	18
	non-aerosol lawn and garden	0.34	0.09	26	0.34	0.09	26
Laundry prewash	Aerosols/solids						

Table 1 Estimated VOC Emission Reductions for Chemically Formulated Consumer Products Based on Proposed Amendments To N.J.A.C. 7:27- 24							
Consumer Products Category		Estimated VOC Reductions based on USEPA and CARB Survey's (1)(2)			Estimated VOC Reductions based on CARB Survey		
		2000 VOC Emission (tpd)	2000 Emission Reduction (tpd)	Percent Emission Reduction	2000 VOC Emission (tpd)	2000 Emission Reduction (tpd)	Percent Emission Reduction
	All other forms						
Metal Polish/Cleanser		0.09	0.04	41	0.09	0.04	41
Multi-purpose Lubricant (excluding solid or semi-solid products)		1.54	0.62	40	1.54	0.62	40
Non-selective Terrestrial Herbicide	Non-aerosols	0.89	0.68	77	0.89	0.68	77
Paint Remover or Stripper		0.52	0.05	10	0.52	0.05	10
Penetrant		0.14	0.04	27	0.14	0.04	27
Rubber and Vinyl Protectant	non-aerosols	0.24	0.22	93	0.24	0.22	93
	aerosols	0.19	0.06	31	0.19	0.06	31
Sealants and Caulking Compounds		0.47	0.20	42	0.47	0.20	42
Silicone-based Multi-purpose Lubricant (excluding solid or semisolid products)		0.19	0.07	34	0.19	0.07	34
Spot Remover	aerosols	0.05	0.01	26	0.05	0.01	26
	non-aerosols	0.08	0.06	68	0.08	0.06	68
Tire Sealants and Inflators		0.23	0.08	36	0.23	0.08	36
Undercoating		0.06	0.02	25	0.06	0.02	25
Wasp and Hornet Insecticide		0.17	0.07	39	0.17	0.07	39
Antiperspirant/Deodorant		0.95	0.39		0.95	0.39	
TOTAL		34.88	11.71	33.6	33.18	10.38	31.3
Projected NJ 2000 Emissions Inventory		80.15			80.15		
PERCENT REDUCTION OF INVENTORY				14.6			13.0

Notes:
(1) CARB, "A Proposed Regulation to Reduce Volatile Organic Compound Emissions From Antiperspirants and Deodorant", September 1989
CARB, "Proposed Regulation To Reduce Volatile Organic Compound Emissions From Consumer Products", Staff Report, August 1990
CARB, "Proposed Amendments to the Statewide Regulation to Reduce Volatile Organic Compound Emissions From Consumer Products, Phase II", October 1991
CARB, "Initial Statement of Reasons for Proposed Amendments to the California Regulations For Reducing Volatile Organic Compound Emissions From Anti-perspirants and Deodorants, Consumer Products and Aerosol Coatings", August 11, 1995
CARB, "Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation", June 6, 1997
CARB, "Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation", September 10, 1999
(2) USEPA, "Study of Volatile Organic Compound Emissions From Consumer and Commercial Products", Report to Congress, March 1995

As shown in Table 1, calculations were performed under two scenarios. The first scenario used survey information from USEPA's 1990 survey combined with California's survey information for the categories not in the USEPA survey. The second scenario used California survey information only. The estimated 14.2 percent VOC emission reduction falls within the range calculated under these two scenarios.

It is estimated that the proposed rules and amendments will achieve a 14.2 percent reduction of the CFCPs VOC emissions inventory, as defined by the USEPA, beyond the current Federal rule. This is a reduction of approximately 32 percent of the categories being regulated (the entire CFCPs inventory is not being regulated).

As shown in the regional study⁴, it is estimated that the rule will result in a reduction of VOC emissions of approximately 11 tpd in New Jersey in 2005 and 12 tpd in 2007. Regionally, it is estimated that the rule will result in a reduction of VOC emissions of approximately 8.7 tons per day (tpd) in the multi-state Philadelphia Non-attainment Area in 2005 and 26.3 tpd in the multi-state New York Non-attainment Area in 2007.

⁴ Ibid

II. ECONOMIC IMPACT ANALYSIS

Introduction

Economic Impact

The analysis and discussion herein is based on the economic analyses performed by CARB historically⁵, for VOC limits more stringent than the existing New Jersey and Federal rules. California has regulated VOCs in CFCPs through four main phases of regulations, Phase I in 1990, Phase II in 1991, Phase III or Midterm Measures in 1997 and Midterm Measures II in 1999. The proposed New Jersey rules and amendments are primarily based on the most stringent of California's four phases of regulation. The majority of the proposed VOC limits, which are more stringent than the existing New Jersey and Federal rules, are contained in California's more recent Midterm Measures and Midterm Measures II rules. Information regarding the CARB economic analyses can be found on the CARB Consumer Products website at <http://www.arb.ca.gov/consprod/consprod.htm>. The Department believes that consumer product sales in California are comparable to those in the northeast, proportioned by population, for the purposes of conducting this economic analysis. In addition, many manufacturers market consumer products nationally.

Relying on CARB's analyses provides an overall conservative approach. The

⁵ CARB, "A Proposed Regulation to Reduce Volatile Organic Compound Emissions From Antiperspirants and Deodorant", September 1989

CARB, "Proposed Regulation To Reduce Volatile Organic Compound Emissions From Consumer Products", Staff Report, August 1990

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CARB, "Initial Statement of Reasons for Proposed Amendments to the California Regulations For Reducing Volatile Organic Compound Emissions From Anti-perspirants and Deodorants, Consumer Products and Aerosol Coatings", August 11, 1995

CARB, "Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation", June 6, 1997 (Midterm Measures)

CARB, "Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation", September 10, 1999 (Midterm Measures II)

Department's cost estimates may be somewhat inflated, since the Department conservatively assumed that manufacturers will incur the same costs to comply with the proposed New Jersey rules and amendments as they incurred to comply with CARB's regulations. In reality, manufacturers of nationally marketed products will incur some costs, such as reformulation costs, only once, to comply with the CARB regulations. In addition, manufacturers will have to reformulate for the other states in the northeast region adopting the OTC model rule.

The economic analysis used by CARB for their Midterm Measures and Midterm Measures II represents a significant update to and expansion of the methodology used to conduct the cost-effectiveness analyses for the original Phase I and Phase II consumer products rulemakings. Therefore, more detail is presented for the categories of products that were regulated in CARB's last two phases of regulation, Midterm Measures and Midterm Measures II. Some of the more stringent limits in the New Jersey proposed rules and amendments were contained in California's Phase I and Phase II regulations. CARB did not present detailed information by category for these two phase's of regulation. However, the overall cost-effectiveness calculated by CARB for Phase I and Phase II are similar to Midterm Measures and Midterm Measures II.

CARB's data from Midterm Measures and Midterm Measures II was compiled, input into a spreadsheet and recalculated based on New Jersey's proposed rules and amendments. CARB's data and spreadsheets were adjusted to account for differences in the regulated products between California and New Jersey. There are differences because the proposed New Jersey rules and amendments do not regulate windshield washer fluids and nail polish removers at the same VOC

limits as the CARB rules. Even so, the results of New Jersey's economic analysis are similar to California's.

VOC limits for hairspray, anti-perspirants and deodorants, and adhesives were proposed in California prior to their Midterm Measures proposal. The cost data CARB used for these categories was included in our analysis, but may be overestimated. CARB subsequently determined that some of their assumptions for Phase I and II non-recurring costs were too high. In addition, the limits originally proposed in California for aerosol anti-perspirants and adhesives were re-evaluated by CARB based on industry comments and determined to be infeasible. Therefore, the costs to reformulate these products in CARB's analysis are overestimated.

CARB also used a conservative approach in assuming there would be no cross-line technology transfers. For example, CARB did not account for potential savings in one-time research and development and other costs that could apply to several products that a single manufacturer produces. While CARB was aware that companies undertake these types of efforts and similar efforts to reduce costs whenever possible, CARB found it difficult to quantify such cost savings, given the complexity and high degree of competitiveness in the consumer products industry.

The CARB economic impact analysis, on which the Department's analysis is based, evaluated the proposed VOC limits for cost-effectiveness, their potential effects on businesses subject to the limits, and the potential cost impacts to consumers. In conducting its economic

analysis, CARB consulted a combination of publicly available financial databases (Dun and Bradstreet, Ward's Business Directory of U.S. Manufacturing Industries), numerous consumer and commercial products surveys, and industry journals and literature, such as the Chemical Market Reporter. CARB also incorporated projected cost information provided by industry representatives.

CARB assumed changes in packaging, labeling, distribution and other recurring costs to be negligible relative to baseline levels of these costs (CARB, 1997). Worst-case formulations (from a cost standpoint) using HFC-152a or HFC-134a as propellants were assumed for compliant aerosol products if no other, less costly propellant systems were considered to be likely used in "typical" compliant formulations; despite this assumption, alternative formulations using other non-VOC propellants, compressed gases, or dimethyl ether (DME), or some combination with these or existing propellant systems may allow even lower-cost compliant products than shown in CARB's analysis.

In addition, New Jersey was part of a regional group, organized by the OTC and made up of OTC state representatives, that met with representatives of the CFCP industry several times from July 2000 to January 2001. In developing the model rule, the regional group attempted to minimize the economic impact to manufacturers by listening to the concerns of industry, maintaining uniformity with the CARB rules, making changes to the CARB rules where appropriate, minimizing reporting, record keeping and labeling requirements, providing flexibility options, streamlining the processing of flexibility options, and setting compliance dates either equal to or later than those in California.

Cost-Effectiveness

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(s) to be achieved by complying with that limit (in annual pounds or tons). The cost-effectiveness is presented to show the proposal's cost efficiency in reducing a pound of VOC. First, annual costs were calculated. Annual costs include annualized non-recurring costs (e.g., total research and development, product and consumer testing, equipment purchases/modifications, etc.) and annual recurring costs (e.g., raw materials, labeling, packaging, etc.).

For each product category (see categories in Table 2), CARB estimated non-recurring and recurring "low" and "high" costs. These "low" and "high" costs are a range of estimated costs. Non-recurring fixed costs were annualized using the cost recovery method, with a cost recovery factor (CRF) of 0.16274 corresponding to 10 percent interest over a 10 year project horizon (see CARB staff report references in footnotes to Table 2).

The projected annual costs then became the inputs for determining the three main outputs of the economic analysis: estimated cost-effectiveness, the potential business impacts and the potential consumer impacts. The projected annual costs were divided by the number of product units sold to result in a cost per unit. The estimated cost-effectiveness in dollars per pound of VOC reduced, and estimated cost in dollars per unit, by product category, are shown in Table 2. A summary of the overall cost analysis is shown in Table 3.

Table 2
Cost Analysis Summary by Product Category for Chemically Formulated Consumer Products
Based on Proposed Amendments To N.J.A.C. 7:27- 24

CATEGORY	Estimated Cost-effectiveness (\$/lb VOC reduced)			Estimated Cost per Unit (\$/unit)		
	Low	High	Avg.	Low	High	Avg.
MIDTERM MEASURES II						
AUTOMOTIVE CARE:						
Automotive Windshield Washer Fluids	NA	NA	NA	NA	NA	NA
Automotive Brake Cleaners	\$0.44	\$1.20	\$0.82	\$0.02	\$0.03	\$0.02
Carburetor, Choke Cleaners	\$0.09	\$0.19	\$0.14	\$0.02	\$0.04	\$0.03
Engine Degreasers -(Aerosols)	\$0.35	\$0.67	\$0.51	\$0.04	\$0.06	\$0.05
Engine Degreasers (non-Aerosols)	-\$0.49	\$0.27	\$0.00	\$0.00	\$0.00	\$0.00
Tire Inflator and Sealant	\$1.50	\$1.59	\$1.54	\$0.25	\$0.26	\$0.26
		ERWA =	\$0.38			
HOUSEHOLD CARE:						
Construction, Panel, and Flooring Adhesives	\$1.64	\$2.02	\$1.83	\$0.16	\$0.19	\$0.17
Double-Phase Aerosol Air Freshener	\$0.75	\$0.79	\$0.77	\$0.04	\$0.04	\$0.04
Furniture Maintenance Products (Aerosols)	\$0.47	\$0.82	\$0.64	\$0.03	\$0.04	\$0.03
General Purpose Cleaners (Dilutables)	-\$3.19	-\$3.92	\$0.00	\$0.00	\$0.00	\$0.00
General Purpose Cleaners (Ready-to-Use)	\$1.97	\$3.17	\$2.57	\$0.03	\$0.04	\$0.03
General Purpose Degreasers (Dilutables)	-\$1.18	-\$1.32	\$0.00	\$0.00	\$0.03	\$0.01
General Purpose Degreasers (Ready-to-Use)	-\$0.42	\$0.00	\$0.00	\$0.00	\$0.04	\$0.02
General Purpose Degreaser/Solvent Parts Cleaner (Aerosol)	\$0.25	\$0.36	\$0.30	\$0.11	\$0.16	\$0.13
Glass Cleaners (Dilutables)	-\$0.45	-\$0.22	\$0.00	\$0.00	\$0.00	\$0.00
Glass Cleaners (Ready-to-Use, Non-Aerosol)	-\$0.51	\$0.30	\$0.00	\$0.00	\$0.01	\$0.01
Sealant and Caulking Compounds	-\$0.18	\$0.14	\$0.00	\$0.00	\$0.01	\$0.00
		ERWA =	\$0.68			
PERSONAL CARE:						
Hair Mousses	\$0.75	\$2.56	\$1.65	\$0.03	\$0.09	\$0.06
Nail Polish Remover	NA	NA	NA	NA	NA	NA
		ERWA =	\$1.65			
PESTICIDES:						
Insecticide Crawling Bug (Aerosols)	\$0.58	\$2.27	\$1.43	\$0.02	\$0.07	\$0.05
Insecticide Flying Insect (Aerosols)	\$0.77	\$6.31	\$3.54	\$0.04	\$0.28	\$0.16
Insecticide Lawn and Garden (Non-Aerosol)	-0.16	\$0.28	\$0.06	\$0.00	\$0.00	\$0.00
		ERWA =	\$1.17			
MIDTERM MEASURES II TOTALS						
	MIN		-\$3.19	MIN		\$0.00
	MAX		\$6.31	MAX		\$0.28
	OVERALL ERWA		\$0.67	SWA		\$0.02
MIDTERM MEASURES I						
AUTOMOTIVE CARE:						
Automotive Rubbing/Polishing (all forms)	-\$0.78	-\$0.24	\$0.00	\$0.00	\$0.00	\$0.00
Automotive Wax, Polish, Sealant, Glaze (semi&all other)	\$0.46	\$1.01	\$0.74	\$0.09	\$0.13	\$0.11
Automotive Wax, Polish, Sealant, Glaze (hard paste)	-\$0.32	-\$0.14	\$0.00	\$0.00	\$0.00	\$0.00
Automotive Wax, Polish, Sealant, Glaze (instant detailer)	-\$0.28	\$0.89	\$0.30	\$0.00	\$0.00	\$0.00
Bug & Tar Remover	-\$0.07	\$0.64	\$0.28	\$0.00	\$0.07	\$0.03
Multi-Purpose Lubricant (excl. solid/semisolid), Tier1	\$0.18	\$0.34	\$0.26	\$0.17	\$0.18	\$0.18
Multi-Purpose Lubricant (excl. solid/semisolid), Tier2	\$1.84	\$1.87	\$1.86			
Penetrant (excl. solid/semisolid), Tier1	\$0.35	\$2.45	\$1.40	\$0.05	\$0.18	\$0.11
Penetrant (excl. solid/semisolid), Tier2	\$0.20	\$0.62	\$0.41			
Rubber & Vinyl Protectant (aerosol)	\$1.08	\$1.72	\$1.40	\$0.47	\$0.60	\$0.53
Rubber & Vinyl Protectant (non-aerosol)	\$0.03	\$0.40	\$0.22	\$0.01	\$0.13	\$0.07
Silicone-based Multi-Purp. Lubricant (excl. solid/semi)	\$0.95	\$1.70	\$1.33	\$0.33	\$0.53	\$0.43
Undercoating (aerosol)	\$0.25	\$1.46	\$0.85	\$0.03	\$0.19	\$0.11
		ERWA =	\$0.76			
HOUSEHOLD CARE:						
Carpet & Upholstery Cleaner (aerosol)	\$2.32	\$7.11	\$4.71	\$0.04	\$0.11	\$0.08
Carpet & Upholstery Cleaner (non-aerosol, dilutable)	-\$1.28	\$0.51	\$0.00	\$0.00	\$0.00	\$0.00
Carpet & Upholstery Cleaner (non-aerosol, RTU)	-\$1.44	-\$1.09	\$0.00	\$0.00	\$0.00	\$0.00
Floor Wax Stripper (non-aerosol)	-\$0.56	-\$0.35	\$0.00	\$0.00	\$0.00	\$0.00

**Table 2
Cost Analysis Summary by Product Category for Chemically Formulated Consumer Products
Based on Proposed Amendments To N.J.A.C. 7:27- 24**

CATEGORY	Estimated Cost-effectiveness (\$/lb VOC reduced)			Estimated Cost per Unit (\$/unit)		
	Low	High	Avg.	Low	High	Avg.
	General Purpose Degreaser (aerosol)	\$0.30	\$0.92	\$0.61	\$0.11	\$0.31
General Purpose Degreaser (non-aerosol)	-\$0.05	\$0.17	\$0.06	\$0.00	\$0.00	\$0.00
Metal Polish or Cleaner	-\$0.49	-\$0.37	\$0.00	\$0.00	\$0.00	\$0.00
Paint Remover or Stripper, Tier1	-\$3.58	-\$0.33	\$0.00	\$0.00	\$0.00	\$0.00
Paint Remover or Stripper, Tier2	-\$0.81	-\$0.01	\$0.00			
Spot Remover (aerosol)	\$0.40	\$6.06	\$3.23	\$0.00	\$0.28	\$0.14
Spot Remover (non-aerosol)	-\$1.21	\$0.02	\$0.00	\$0.00	\$0.00	\$0.00
		ERWA =	\$0.13			
PERSONAL CARE:						
Hair Shine	\$1.61	\$1.73	\$1.67	\$0.56	\$0.60	\$0.58
Heavy Duty Hand Cleaner or Soap, Tier1	\$0.40	\$1.11	\$0.76	\$0.25	\$0.59	\$0.42
Heavy Duty Hand Cleaner or Soap, Tier2	\$3.43	\$7.73	\$5.58			
		ERWA =	\$2.00			
PESTICIDES:						
Non-Selective Terrestrial Herbicide	\$0.18	\$0.26	\$0.22	\$0.02	\$0.02	\$0.02
Wasp and Hornet Insecticide	\$0.00	\$0.32	\$0.16	\$0.00	\$0.03	\$0.01
		ERWA =	\$0.21			
MIDTERM MEASURES I TOTALS						
	MIN		-\$3.58	MIN		\$0.00
	MAX		\$7.73	MAX		\$0.60
		OVERALL ERWA	\$0.68	SWA		\$0.03
PRIOR TO CA MIDTERM MEASURES AND MORE STRINGENT THAN FEDERAL RULE						
Hairspray	\$2.10	\$2.50	\$2.30			
Anti-perspirants and Deodorants	\$0.54	\$1.30	\$0.92			
Household Adhesives (see Note 8 below)	\$0.02	\$0.40	\$0.21	\$0.02	\$0.51	
GRAND TOTALS						
	MIN		-\$3.58	MIN		\$0.00
	MAX		\$7.73	MAX		\$0.60
		OVERALL ERWA	\$1.15	SWA		\$0.03

Notes:

1. Calculations and footnotes are based on spreadsheets, formulas and data from the following CARB staff reports:

"Proposed Regulation to Reduce VOC Emissions from Consumer Products, Aug 1990"

"Proposed Amendments to the Statewide Regulation to Reduce VOC Emissions from Consumer Products Phase II, Oct 1991"

"Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation, June 6, 1997"

"Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation, Sept 10, 1999"

The CARB data in this table has been modified by the Department to account for the differences between the CARB rule and the OTC model rule (most notably, windshield washer fluids and nail polish removers).

2. **ERWA** = emission reduction-weighted average

3. **SWA** = sales weighted average

4. Avg. Cost-effectiveness shown as "\$0.00" means the average of the low and high cost-effectiveness for the category was either 0 or negative.

5. Non-recurring fixed costs annualized using Cost Recovery Method, with a Cost Recovery Factor (CRF) of 0.16274 corresponding to 10 percent interest over a 10 year project horizon.

6. For non-recurring costs, "low" and "high" refer to range of estimated fixed costs; for recurring costs, "low" and "high" refer to "All Other" ingredients assumed to cost \$3.50/lb and \$7.00/lb, respectively, unless otherwise noted in individual category cost spreadsheets.

7. For wasp and hornet insecticide, the "low" and "high" recurring costs shown are arithmetic averages of the applicable ranges for this category.

8. The cost analysis results for household adhesives are overestimated because CARB subsequently changed the VOC limit requirement for household adhesives, which lowered industry costs.

Table 3 Cost Analysis Summary for Chemically Formulated Consumer Products Based on Proposed Amendments To N.J.A.C. 7:27- 24		
ESTIMATED COST- EFFECTIVENESS (\$/pound of VOC reduced)	Minimum (by product category)	net savings
	Maximum (by product category)	\$7.73
	ERWA for hairspray	\$2.25
	ERWA hairspray not included	\$0.70
	ERWA hairspray included	\$1.15
ESTIMATED COST PER UNIT (\$/unit)	Minimum	net savings
	Maximum	\$0.60
	SWA	\$0.03
Notes: ERWA = emission reduction-weighted average SWA = sales weighted average		

Annualized non-recurring fixed costs to reformulate all non-compliant products, per product category (see categories in Table 2), were projected by CARB (see staff report references in footnotes to Table 2) to range from a low of approximately \$12,000 per year to a high of approximately \$5.2 million dollars per year. This does not include a conservative estimated upper bound of \$12,000,000 for adhesives, which is overestimated based on CARB’s subsequent changes to their regulations for adhesives. The lower range includes non-aerosol carpet and upholstery cleaners, tire inflator and sealant, penetrant, engine degreasers, multi-purpose lubricant and hair shine. The upper range includes insecticides aerosol carpet & upholstery cleaner and floor wax stripper.

Annualized non-recurring fixed costs of reformulation per-product, within a product category (the categories in Table 2), were projected by CARB to range from a low of approximately \$1,379 per year to a high of approximately \$89,488 per year. This does not

include a conservative estimate of \$270,000 for adhesives, which is overestimated based on CARB's subsequent changes to their regulations for adhesives. The lower range includes automotive products while the upper range includes insecticides.

Overall total annualized non-recurring fixed costs to reformulate all non-compliant products were projected by CARB to range from a low of approximately \$6.8 million per year to a high of approximately \$64 million dollars per year (not including the estimated \$12,000,000 for adhesives). Adjusting CARB's numbers to account for the differences in regulation between New Jersey and California (windshield washer fluids and nail polish removers), the overall total annualized non-recurring fixed costs to reformulate all non-compliant products were calculated to range from a low of approximately \$6.7 million per year to a high of approximately \$63 million dollars per year (not including the estimated \$12,000,000 for adhesives).

As shown in Table 2, the estimated cost-effectiveness of the proposed limits for each product category ranges from no cost (and in some cases a net savings) to approximately \$7.73 per pound of VOC reduced. The cost-effectiveness lower range includes paint remover or stripper, dilutable general purpose cleaners, and non-aerosol carpet and upholstery cleaners. The cost-effectiveness upper range includes heavy duty hand cleaner, aerosol carpet & upholstery cleaner, spot remover, insecticides, and hair spray.

Another useful calculation is the emission reductions-weighted average (ERWA) cost-effectiveness. This value is obtained by multiplying the emission reductions for each product category by its associated cost-effectiveness, then taking the sum of these multiplications and dividing by the sum of the total emission reductions for all the proposed limits. The ERWA

cost-effectiveness accounts for the relative magnitude of emission reductions and the relative efficiency of each limit in achieving those reductions.

The estimated ERWA cost-effectiveness is \$1.15 per pound of VOC reduced or \$2,300 per ton of VOC reduced. The estimated ERWA cost-effectiveness excluding hairspray is \$0.70 per pound. The estimated cost-effectiveness for hairspray of \$2.25 per pound significantly affects the ERWA due to the large emission reductions estimated from this category. The estimated cost-effectiveness that was calculated for New Jersey is slightly higher than what was calculated for California. This is due to CARB's lower VOC limits for windshield washer fluids and nail polish removers. CARB calculated a net savings to industry in the cost of production of these products, due to a lower VOC limit.

Potential Business Impact

The proposed rules and amendments for CFCP would primarily impact manufacturers of these products, since they may have to reformulate their products. Businesses that market, distribute, supply, sell or use these CFCPs may also be affected by the proposed rules and amendments. Businesses that supply ingredients and equipment to manufacturers of the products may also be impacted by the proposed rules and amendments. A mitigating factor to retailers is that most products manufactured prior to January 1, 2005, may still be sold in New Jersey even if they do not meet the proposed VOC limits. However, the proposed rules and amendments prohibit the manufacturer or sale after January 1, 2005, of any aerosol adhesive containing methylene chloride, perchloroethylene or trichloroethylene.

Information regarding manufacturers of CFCPs located in New Jersey was obtained from

the U.S. Census Bureau report, 1997 Economic Census, Manufacturing, issued May 2000, which provides a list of manufacturers by North American Industry Classification System (NAICS). However, the NAICS is much broader than the categories in the proposed rules and amendments, and also includes manufacturers of products that are not regulated by these rules. Also, some of the establishments in the report may be a single company with different locations in New Jersey. The U.S. Census Bureau report does not indicate how many of the manufacturers are small businesses.

According to the US Census Bureau report, there are 179 manufacturing establishments in New Jersey classified under soap, cleaning compound, and toilet preparation manufacturing (perfumes, shaving preparations, hair preparations, face creams, and other cosmetics). The 179 establishments consist of 88 soap and cleaning compound manufacturing establishments, 41 soap and other detergent manufacturing establishments, 28 polish and other sanitation good manufacturing establishments, 19 surface active agent manufacturing establishments, and 91 toilet preparation manufacturing establishments. The report also identifies two manufacturing establishments in New Jersey classified as pesticide and other agricultural chemical manufacturing establishments, and there are 53 manufacturing establishments in New Jersey classified as adhesive manufacturing establishments.

The New Jersey Department of Labor (NJDOL), Trends in Employment and Wages, 2000, shows 211 manufacturing establishments in New Jersey classified as soap, detergents, cleaning preparations, perfumes, cosmetics and other toilet preparations. Although the NJDOL publication is more recent than the U.S. Census Bureau report, the NJDOL publication uses the older Standard Industrial Classification (SIC) system, which is broken down into fewer

categories than the newer NAICS.

According to a representative of the Consumer Specialty Products Association, Inc. (CSPA), 43 of their member companies have facilities in New Jersey. Nationwide, most of CSPA's 220 plus member companies are small businesses. Three of their members in New Jersey are small businesses.

The business impact analysis conducted by CARB assumed that all of the costs will be absorbed by manufacturers, which may not be the actual effect because some or all of the costs may be passed on to the consumer. The CARB conducted a return on owner's equity (ROE) analysis. ROE is used to measure profitability and was calculated by dividing the net profit by the net worth. Compliance cost was estimated for each business in the analysis. The estimated cost per unit is shown above in Table 2. The compliance cost was then subtracted from net profit data.

The analysis showed a change in ROE from no change to approximately 5 percent decrease⁶. The lower range includes the perfume, cosmetics and other toilet preparations industry. The upper range includes the soap, detergents and specialty cleaners industry. The average calculated decrease in ROE was approximately 1.4 percent for CARB's Midterm Measures II and approximately 2.32 percent for CARB's Midterm Measures. A decrease of 10 percent is used by CARB as a threshold to indicate a potentially significant impact on

⁶ CARB, "Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation", June 6, 1997 (Midterm Measures)

CARB, "Initial Statement of Reasons for Proposed Amendments to the California Consumer Products Regulation", September 10, 1999 (Midterm Measures II)

profitability⁷. According to CARB, this threshold is consistent with the thresholds used by USEPA and others. Therefore, the CARB economic analysis concluded that most manufacturers would be able to absorb the cost of the proposed rules and amendments with no significant adverse economic impacts.

In addition, the ROE analysis for the proposed limits may overestimate the impact on business because it assumes that all of the costs of the proposed limits will be absorbed by manufacturers. Some of the costs may be passed on to the consumer. The analysis also does not quantify the extent of cost mitigation due to “technology-transfer” between product lines and from third-party manufacturers (i.e., contract fillers) who fill essentially equivalent products for a number of competing businesses.

The proposed rules and amendments will primarily impact manufacturers; however, other industries could also be impacted to a lesser amount, more difficult to quantify. These industries include distributors, retailers, and upstream suppliers who supply containers, valves, solvents, propellants, and other chemicals used in CFCs.

Upstream suppliers could potentially be impacted by the proposed rules and amendments. Manufacturers may purchase different solvents, propellants, and other materials for their reformulated products. They may also purchase different containers, valves, or other components for their reformulated products. However, the Department does not expect these changes to result in a significant adverse impact on the affected industries because chemical companies generally supply many different industries. Moreover, many of the upstream suppliers also

⁷ Ibid

provide the alternative products that manufacturers will be use in their reformulated products. Some upstream suppliers may actually benefit since the proposed rules and amendments are likely to create new or increased demand for alternative materials to be used in compliant formulations.

Distributors could be impacted if some manufacturers decide to carry a dual inventory of products. Most manufacturers that were contacted by CARB have indicated that they will not manufacture dual inventories because dual-distribution systems are expensive to establish and maintain. Distributors and retailers may be impacted if the potential increase in costs of products dampen demand for the products. The potential consumer impact analysis assumes that manufacturers, distributors and retailers pass on any additional compliance costs to the consumers. This may be conservative because the manufacture may absorb some or all of the cost of compliance. Based on the potential consumer impact analysis, discussed below, the Department does not anticipate any significant adverse economic impacts for distributors and retailers.

Impacts to businesses that use CFCs would be similar to the potential additional costs a consumer would experience as discussed below in “Potential Consumer Impact.” Based on the consumer impact analysis, the Department does not anticipate any significant adverse economic impacts for businesses who use CFCs.

CARB’s economic analysis concluded that most manufacturers will be able to absorb the cost of the proposed rules and amendments with no significant adverse economic impact. However, some individual businesses may be adversely affected by this regulatory action. The

proposed rules and amendments may impose extraordinary economic hardship on some businesses with small or no margin of profit. These businesses may be able to use the variance provision of the proposed rules and amendments to extend the deadline by which they must comply, and thereby minimize the cost impacts. They may also be able to use the innovative product exemption or the alternative control plan exemption. New Jersey accepts variances, innovative product exemptions and alternative control plan exemptions only if they have been approved by CARB or another state which has a rule based on the OTC model rule.

Potential Consumer Impact

The estimated cost per unit that the manufacturers may pass on to the consumers by raising the price of products that need to be reformulated is discussed below. However, this estimate is conservative because the manufacturers may absorb some or all of the costs of compliance. In their analysis, CARB estimated cost impacts from the proposed limits on raw material costs. The raw material costs generally constitute the major portion of the compliance costs for most categories. The estimated raw materials cost per unit of product ranges from no cost (or net savings) to approximately \$0.58 per unit. The lower range includes floor wax stripper, print remover and spot remover. The upper range includes rubber and vinyl protectant, heavy duty hand cleaner, silicone-based multi-purpose lubricant, tire inflator and sealant.

The cost per unit evaluates the combined impacts of both recurring (i.e., raw materials costs) and nonrecurring costs from the proposed limits. Although the raw material costs generally constitute the major portion of the compliance costs, in some categories, like pesticides, the nonrecurring (fixed) cost was the major contributor.

As shown in Table 2, the estimated cost per unit ranges from no cost increase (net savings or no cost for various categories) to approximately \$0.60 per unit of product. The lower range includes automotive wax, polish, sealant, glaze, insecticides, and non-aerosol carpet and upholstery cleaners. The upper range includes rubber and vinyl protectant, hair shine, heavy duty hand cleaner, and silicone-based multi-purpose lubricant. This upper range does not include household adhesives, which are overestimated because CARB subsequently changed the VOC limit requirement for household adhesives, thereby lowering the figure for industry costs. When averaged over the sales volume for each category, the estimated sales-weighted average cost per unit is approximately \$0.03 per unit. Based on the economic analysis, the Department does not anticipate any significant adverse effects on consumers.

Results Summary

The estimated cost-effectiveness of the proposed rules and amendments for CFCPs was estimated to be \$2,300 per ton of VOC. The estimated cost per unit ranges from no cost increase (net savings or no cost for various categories) to approximately \$0.60 per unit of product, with a sales weighted average cost per unit of \$0.03 per unit. Based on the economic impact analysis, the Department believes the proposed rules and amendments are cost-effective. The Department does not anticipate significant adverse economic impact on manufacturers, distributors, retailers, businesses that use CFCPs or consumers. These costs of compliance may be absorbed by the manufacturer, passed on to the consumer or shared.