California Environmental Protection Agency

Air Resources Board

INITIAL STATEMENT OF REASONS
FOR
PROPOSED AMENDMENTS PERTAINING TO HAIRSPRAY
IN THE CALIFORNIA CONSUMER PRODUCTS REGULATION

Release Date:
February 7, 1997

TITLE 17. CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER ADOPTION OF PROPOSED AMENDMENTS PERTAINING TO HAIRSPRAY IN THE CALIFORNIA CONSUMER PRODUCTS REGULATION

The Air Resources Board (ARB/Board) will conduct a public hearing at the time and place noted below to consider adoption of amendments relating to hairsprays in the Regulation for Reducing Volatile Organic Compound (VOC) Emissions from Consumer Products (The California Consumer Products Regulation).

DATE:	March 27, 1997
TIME:	9:00 a.m.
PLACE:	Air Resources Board Board Hearing Room, Lower Level 2020 L Street Sacramento, California

This item will be considered at a one-day meeting of the ARB, which will commence at 9:00 a.m., March 27, 1997. Please consult the agenda for the meeting, which will be available at least 10 days before March 27, 1997, to determine the time when this item will be considered.

INFORMATIVE DIGEST OF PROPOSED ACTION AND PLAIN ENGLISH POLICY STATEMENT OVERVIEW

Sections Affected: Proposed amendments to sections 94509, 94513, and 94514, 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 compounds (VOCs) emitted by consumer products. As part of the regulatory process, the ARB must determine that adequate data exists 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.

Pursuant to Health and Safety Code section 41712, the Board has approved the California Consumer Products Regulation; sections 94507-94517, Title 17, CCR, which was adopted by the Board in two phases. Phase I was approved on October 11, 1990, and Phase II was approved on January 9, 1992.

A two-tired standard for hairspray was included as part of the Phase I Board action. The first-tier standard of 80 percent VOC became effective on January 1, 1993. The second-tier standard of 55 percent VOC will become effective on January 1, 1998. When the second-tier standard for hairspray was adopted, the Board recognized that the standard would present formulation challenges to manufacturers. Therefore, the Board directed the staff to report on industry's progress in meeting the standard prior to 1998.

The hairspray category represents the largest and single most significant source of consumer product VOC emissions in California with an estimated 46 tons per day of VOC emissions in 1990. The 80 percent VOC limit reduced these VOC emissions by approximately 7 tons per day statewide. The 55 percent VOC limit will reduce VOC emissions by an additional 14 tons per day. Both of these limits became federally enforceable as part of the approved State Implementation Plan (SIP) when the consumer products regulation was approved by the United States Environmental Protection Agency (U.S. EPA) as a SIP revision on February 14, 1995.

Description of the Proposed Regulatory Action

ARB staff is proposing the following amendments for Board approval:

1. Postpone the 55 percent VOC standard from January 1, 1998 to June 1, 1999.

The consumer products regulation currently specifies a 55 percent VOC standard for hairsprays, effective January 1, 1998. Staff is proposing to postpone the effective date of the 55 percent standard until June 1, 1999. After extensive consultation with industry representatives and upon completion of our own analysis, staff concluded that the additional time proposed is needed for hairspray manufacturers to complete reformulation research, consumer testing, and final product development. Fortunately, the emission reductions committed to in the SIP will not be compromised because the air pollution control districts have not claimed these reductions until the beginning of the 1999 summer ozone season.

2. Require plans demonstrating progress toward compliance (with periodic updates) from manufacturers selling hairsprays not meeting the 55 percent VOC standard during the period from January 1, 1998 to June 1, 1999.

We are proposing that hairspray manufacturers be required to submit plans demonstrating progress toward compliance to the Executive Officer. The plans would outline the specific steps they will take in developing complying products. These plans would be due on or before January 1, 1998, and would be submitted by those manufacturers selling hairspray formulas with a VOC content greater than 55 percent during the period from January 1, 1998 to June 1, 1999. In addition to the initial plan, the manufacturers would also be required to submit periodic progress updates to their plans as the June 1, 1999, date approaches.

3. Modify the variance provision to include a requirement for VOC emissions mitigation when granting a variance request for hairsprays from the June 1, 1999, standard.

The California Consumer Products Regulation currently allows manufacturers to apply for variances if certain criteria are met. The proposed amendment would modify the variance provision to allow the Executive Officer to require mitigation of excess VOC emissions for manufacturers seeking variances for hairsprays after June 1, 1999. This amendment would also allow the Executive Officer to waive all or part of this requirement in certain circumstances.

In addition to these proposed regulatory amendments, staff is proposing to work during the upcoming year with industry representatives to develop an early reduction credit program. Our goal with this program is to provide an incentive for manufacturers to come into compliance early and to reward those manufacturers that do develop 55 percent VOC hairspray products by January 1, 1998. We envision that credits generated by a manufacturer could be used in a variety of ways, such as using credits to obtain additional time to comply with another product standard, selling to other companies needing to mitigate emissions under a variance, or selling in the open market (to non-consumer product sources). Specific regulatory language for the early reduction credit program will be proposed in a future regulatory action.

Comparable Federal Regulations

The U.S. EPA has published a proposed rule, *National Volatile Organic Compound Emission Standards for Consumer Products,*which appeared in the April 2, 1996, Federal Register (Vol. 61, No. 64, pages 14531-14543). The proposed rule specifies VOC standards for hairsprays and other consumer products, and is similar to the ARB's consumer products regulation. However, differences exist between the ARB's regulation and the U.S. EPA's proposed rule; following is a brief description of the more significant of these differences. The U.S. EPA's proposed 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 several product categories which are regulated under the ARB regulation. All of the VOC standards in the U.S. EPA's proposed rule have a standard effective date of September 1, 1996, whereas the VOC standards in the ARB regulation are phased in on various dates from 1993 to 1999. There are no comparable U.S. EPA standards for products in the ARB rule that have effective dates beyond September 1, 1996. The U.S. EPA's proposed rule thus does not have a second tier of "future effective" VOC standards for any product category including hairsprays. Finally, the U.S. EPA's proposed rule has an unlimited "sell-through" period for non-complying products manufactured before the effective date of the standards, whereas California law allows a three year sell-through period.

AVAILABILITY OF DOCUMENTS AND 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 (February 7, 1997). The ISOR contains the full text of the proposed action. 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 immediately 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.

Further inquiries regarding this matter should be directed to Ms. Peggy Taricco, Manager, Technical Evaluation Section, Stationary Source Division, at (916) 322-8283.

COSTS TO PUBLIC AGENCIES AND TO BUSINESSES AND PERSONS AFFECTED

The determinations of the Board's Executive Officer concerning the costs 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 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 the ability of California businesses to compete with businesses in other states, or on directly-affected private persons. In accordance with Government Code section 11346.3, the Executive Officer has determined that the proposed amendments should have minor or positive impacts on the creation or elimination of jobs within the State of California, minor or positive impacts on the creation of new businesses and the elimination of existing business within the State of California, and minor or positive 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, it is likely that some individual businesses may be adversely affected by the proposed regulatory action even though the overall economic impact of the proposed amendments will be positive. Specifically, the postponement of the standard may result in a few

manufacturers or suppliers not realizing the return on their investment that they had planned. Therefore, the Executive Officer finds that the adoption of the proposed amendments may have a significant adverse impact on some businesses. The Executive Officer has considered proposed alternatives that would lessen any adverse economic impact on business and invites you to submit proposals. Submissions may include the following considerations:

(i) The establishment of differing compliance or reporting requirements or timetables which take into account the resources available to businesses;

(ii) Consolidation or simplification of compliance and reporting requirements for businesses;

(iii) The use of performance standards rather than prescriptive standards;

(iv) Exemption or partial exemption from the regulatory requirements for businesses.

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. 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, 5th Floor, Sacramento, CA 95814, no later than 12:00 noon March 26, 1997, or received by the Clerk of the Board at the hearing.

The ARB requests, but does not require, that 20 copies of any written statement be submitted and that all written statements be filed at least 10 days prior to the hearing. 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 HEARING PROCEDURES

This regulatory action is proposed under the authority granted to the ARB in sections 39600, 39601, 39607, 41511, and 41712 of the Health and Safety Code. This action is proposed to implement, interpret, or make specific sections 39002, 39600, 40000, 41511, and 41712 of the Health and Safety Code.

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: January 28, 1997

State of California
AIR RESOURCES BOARD

PROPOSED AMENDMENTS PERTAINING TO HAIRSPRAY IN THE CALIFORNIA CONSUMER PRODUCTS REGULATION

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February 1997

State of California
AIR RESOURCES BOARD

INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING

Public Hearing to Consider

PROPOSED AMENDMENTS PERTAINING TO HAIRSPRAY IN THE CALIFORNIA CONSUMER PRODUCTS REGULATION

To be considered by the Air Resources Board on March 27, 1997 at

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

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

ACKNOWLEDGMENTS

This report and the proposed amendments were developed by the following Air Resources Board staff:

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Initial Statement of Reasons
for
Proposed Amendments Pertaining to Hairspray
in the California Consumer Products Regulation

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VOLUME I: INTRODUCTION AND EXECUTIVE SUMMARY

I.

INTRODUCTION

This report presents the Air Resources Board (ARB/Board) staff's proposed amendments affecting the hairspray category in the California regulation for reducing volatile organic compound (VOC) emissions from consumer products. The amendments are proposed to address certain issues pertaining to this category which we and the affected manufacturers have become aware of through implementing the regulation.

This report represents the Initial Statement of Reasons for Proposed Rulemaking as required by the California Administrative Procedure Act and is comprised of two volumes. Volume I, "Introduction and Executive Summary," provides a short overview of the regulation as it pertains to hairsprays. It also includes a summary of the proposed amendments, the basis for these amendments to the regulation, and an overview of the environmental and economic impacts. For simplicity, this summary is presented in question-and-answer format, including commonly asked questions about our efforts to amend this regulation. Volume II, the Technical Support Document, is a more detailed presentation of the technical basis for the proposed amendments to the regulation.

A. HISTORY AND DESCRIPTION OF THE HAIRSPRAY STANDARD

In 1988, the Legislature enacted the California Clean Air Act (the Act). The Act added section 41712 to the California Health and Safety Code, which requires the ARB to adopt regulations to achieve the maximum feasible reduction in VOCs emitted by consumer products. As part of the regulatory process, the ARB must determine that adequate data exists to adopt the regulations, and that the regulations are technologically and commercially feasible and necessary.

Pursuant to these California Clean Air Act requirements, in October 1990, the Board adopted VOC standards for 16 categories, including hairsprays, as part of the comprehensive consumer products regulation known as “Phase I.” The hairspray standard is comprised of two tiers, 80 and 55 percent VOC. The 80 percent limit became effective on January 1, 1993, and the 55 percent limit will become effective on January 1, 1998. Being the largest single source of consumer product VOC emissions, at 46 tons/day in 1990 in California, the emission reductions realized from the control of hairsprays are significant. Statewide, the 80 percent limit results in a 7.2 tons/day VOC reduction and the 55 percent limit will result in an additional 14 tons/day VOC reduction. Both tiers are now federally enforceable as part of the State Implementation Plan (SIP) since the consumer products regulation was approved as a SIP revision in early 1995.

In the technical support document written for the Phase I rulemaking, we identified certain of the future effective standards, including hairsprays, as technology forcing. The technology forcing standards were standards that, we believed, could not be met by the industry at the time of

rule adoption but could be met within the timeframe provided in the regulation. At the October 1990 hearing the Board found the regulation to be commercially and technologically feasible; however the Board directed the Executive Officer (Board Resolution 90-60, Appendix A) to consult with the consumer product manufacturers who must achieve the future effective VOC limits specified in the Table of Standards and to provide reports on manufacturers' progress to the Board. These reports are intended to identify any significant problems arising in regard to the future effective standards and propose any regulatory modifications that may be appropriate. The Board directed the Executive Officer to consult the regulated public and any other interested parties in the preparation of the reports and to provide these interested parties with an opportunity to make oral and written comments to the Board in conjunction with these reports.

In response to this directive, we conducted a comprehensive analysis of the ability of manufacturers to meet the 55 percent VOC standard for hairsprays. Based on our analysis we concluded that the 55 percent VOC standard is indeed technologically feasible. However, additional time to June 1, 1999 is needed by manufacturers to complete product development and testing to ensure that the 55 percent VOC hairspray formulas will meet customer performance expectations. While we believe most manufacturers will be able to comply with the additional time and that the basic market demand for hairsprays will be met, we do expect that some manufacturers may request variances for additional time beyond the June 1, 1999 date. The Executive Summary that follows summarizes our recommendation and technical assessment. For a complete discussion and description of our technical assessment, please refer to "Volume II, Technical Support Document (TSD)," of this report.

II.

EXECUTIVE SUMMARY

A. INTRODUCTION

In this chapter, we provide a plain English discussion of the staff's proposed amendments to the hairspray category in the consumer products regulation and explain the rationale for the proposed changes. The discussion in this chapter is intended to satisfy the requirements of Government Code 11346.2(a)(1), which requires that a noncontrolling "plain English" summary of the regulation be made available to the public. A more detailed discussion of the proposed regulatory amendments may be found in the TSD, Volume II, Chapter II.

B. PROPOSED AMENDMENTS PERTAINING TO HAIRSPRAYS IN THE CONSUMER PRODUCTS REGULATION

What amendments are proposed for the hairspray category in the consumer products regulation?

We are proposing the following amendments that will affect hairsprays regulated by the consumer products regulation:

- postpone the 55 percent VOC standard from January 1, 1998 to June 1, 1999;
- require plans demonstrating progress towards compliance with periodic updates from manufacturers selling hairsprays not meeting the 55 percent VOC standard during the period from January 1, 1998 to June 1, 1999; and
- modify the variance provision to include a requirement for VOC emissions mitigation when granting a variance request for hairsprays from the June 1, 1999 standard.

In addition to these amendments, we are proposing to work with industry over the next year to develop an early reduction credit program to reward those manufacturers who produce and sell 55 percent VOC hairsprays prior to June 1, 1999.

Why are we proposing these amendments to the consumer products regulation?

We are proposing these amendments to address technical difficulties manufacturers have experienced in meeting the 55 percent standard by January 1, 1998. State law requires that any regulation adopted by the Board for consumer products be commercially and technologically feasible. Based on our technical analysis which includes extensive input from individual manufacturers, we believe, that overall manufacturers cannot produce consumer-accepted 55 percent VOC hairspray formulas by January 1, 1998. While there is general agreement that the

55 percent standard is technologically feasible, manufacturers have demonstrated to us that the standard is not commercially feasible by January 1, 1998. Even though manufacturers have invested significant research and development funds toward the development of 55 percent VOC products, and substantial progress has been made, additional time is needed to address technical problems such as slow dry times and excessive initial curl droop, develop and refine prototype formulations, and conduct test marketing of their products. We believe the proposed amendments will address these concerns while still requiring expeditious compliance.

What are the goals of these amendments?

Our primary goals in developing the proposed amendments are identified below:

- identify the earliest practicable date for which the 55 percent standard can be found to be both technologically and commmercially feasible;
- preserve projected emission reductions from consumer products that are required by the SIP;
- provide an incentive for manufacturers to comply early;
- make it advantageous for manufacturers to take all reasonable steps to comply within any extended timeframe; and,
- provide a mechanism to closely track manufacturers progress toward compliance.

How did ARB staff develop these amendments?

The proposed amendments are based on our findings from conducting a thorough technical assessment for the future effective standard for hairspray as directed by the Board. To gather information for this technical assessment, ARB staff conducted over 117 individual telephone calls, and 16 meetings with manufacturers, distributors, raw material suppliers, and trade associations. Patent and technical literature was also researched and reviewed to better understand and increase our awareness of available and emerging technology. Public workshops were held on April 30, 1996 and October 1, 1996, to discuss the issues related to meeting the 55 percent VOC standard for hairspray. A draft staff analysis (April 30, 1996) and workshop notices were sent to over 3000 interested and affected parties and were made available on the Internet. The workshops were attended by over 50 representatives from the hairspray industry.

Staff worked closely with the affected industry for over 18 months. Member companies from the Cosmetic, Toiletry, and Fragrance Association ("CTFA" or "CTFA Hairspray Group") have been very active in this process and have provided valuable information regarding their experiences in working towards compliance with the standard. The National Aerosol Association also participated in discussions with ARB staff. In addition to meeting with the CTFA Hairspray Group, staff met with many individual companies and received numerous correspondence from hairspray manufacturers and the raw material suppliers to the industry. This effort resulted in valuable information regarding the technologies, timing, and costs to develop products that comply with the 55 percent VOC standard.

Why is the ARB staff proposing to postpone the 55 percent VOC standard to June 1, 1999?

Based on our numerous discussions with hairspray manufacturers, we believe that the vast majority of companies will not have commercially-marketable 55 percent VOC formulas ready by the current compliance date of January 1, 1998. Developments in new resin technologies and the supply of propellant systems have only recently allowed manufacturers to formulate realistic, 55 percent VOC-compliant prototypes. Thus, despite having eight years from the rule adoption to develop 55 percent VOC products (five of those after the first-tier standard became effective in 1993), manufacturers are only now reaching the point where they are close to developing final prototypes for commercially-marketable 55 percent VOC products. Since extensive product testing and refinements are necessary to develop these prototypes into commercially-acceptable products, we believe manufacturers will need additional time beyond 1998.

Prior to 1993, manufacturers were primarily focused on meeting the first-tier, 80 percent VOC standard. Since nearly all products before then were anhydrous (containing little or no water), the industry embarked on developing water-based, 80 percent VOC products with which few of the manufacturers had any previous experience in developing and marketing. By most accounts, they were able to reformulate their products to meet the standard while achieving performance and cost goals consistent with the pre-regulatory products. These reformulations were generally achieved by using existing resin technologies, designed for anhydrous systems, with formulations that could tolerate the low levels of water in 80 percent VOC products.

After 1993, the industry began investing significant resources and time in developing products to meet the second-tier, 55 percent VOC standard. To meet this standard, manufacturers had to consider approaches that required new innovations and formulation technologies. However, new high-water compatible resins, necessary for meeting the more challenging second-tier standard, were not developed at a pace sufficient to enable manufacturers to meet the current January 1998 standard. Resin suppliers, both existing and new companies, are working closely with hairspray manufacturers to develop suitable resin systems. The industry approached us in the fall of 1995 to discuss a time extension when they believed they would not be able to comply with the January 1998 compliance date. During our discussions with industry, CTFA informed us that manufacturers and resin suppliers have collectively spent on the order of $50 million to develop 55 percent VOC hairspray products.

One of the major challenges the industry has encountered is developing a 55 percent VOC formula that has comparable performance characteristics to an 80 percent VOC formula. The ability to do this is key to a manufacturer’s ability to retain customer loyalty, avoid customer complaints, and to preserve brand name integrity. To determine the need for and any appropriate time extension, staff worked closely with industry and requested information on individual manufacturers' research and development efforts. An example of a typical simplified timeline that will be followed when developing a 55 percent VOC hairspray is shown in Figure II-1. As can be seen, about three and one-half years is typically needed to bring a hairspray to market.

FIGURE II-1
TYPICAL REFORMULATION TIMELINE NECESSARY TO MEET
55 PERCENT HAIRSPRAY STANDARD BY JUNE 1, 1999

(AVAILABLE ON REQUEST)

Based on compliance timelines and testing data submitted by various manufacturers, we believe that an extension of time is warranted and that by June 1, 1999 manufacturers will be able to develop, begin to manufacture, and bring to market commercially acceptable hairspray products using a variety of technologies available to formulate compliant hairsprays. This is further supported by data supplied by manufacturers representing at least 30 percent of the market demonstrating that they will, provided all goes well, have compliant products ready by the second quarter, 1999. We also believe that by 1999 this percentage will increase significantly as the technology is shared between manufacturers and the proposed regulatory incentives encourage other manufacturers to streamline and expedite their efforts. Further justification for this time extension is based on one of the more promising technologies that can be used to develop a 55 percent VOC hairspray. This approach relies on the non-VOC propellent HFC-152a. While using HFC-152a is one of the more viable approaches for aerosol hairsprays, manufacturers stated that they were hesitant until only recently to seriously consider this option. This is in part due to the fact that it was only in late 1995 that manufacturers were assured of the supply of HFC-152a, hence research and development efforts using this propellent were only seriously undertaken in late 1995 or early 1996. The additional proposed 17 month extension will provide the necessary time to complete the development of aerosol hairsprays using HFC-152a. In addition, there is one company, IQ Holdings, Incorporated, that has stated they have a proprietary technology and have offered to license their technology to other manufacturers. Manufacturers could license this technology and then optimize the formula to meet their customers needs. This too, we believe, could be accomplished within the timeframe provided.

Is the 55 percent VOC standard technologically and commercially feasible by June 1, 1999?

We believe the 55 percent VOC standard is both technologically and commercially feasible by June 1, 1999. The technical data collected during our assessment demonstrates that there are several technologies available for manufacturers to use when developing the 55 percent VOC hairsprays. In addition, there are a variety of technologies currently under development that show promise for providing additional formulation approaches to manufacturers. The existing and developing technologies allow manufacturers to comply with the regulation by meeting the requirements in the Table of Standards (section 94509) or through the Innovative Product provision (section 94511). Based on our discussions with industry representatives, there appears to be a general consensus that the 55 percent VOC limit is technologically feasible. The CTFA Hairspray Group has acknowledged the standard's technological feasibility. The main question, therefore, is whether additional time beyond 1998 is needed for manufacturers to further develop new formulations into a final form which is commercially feasible. The staff's proposed amendments are intended to address the need for additional time.

We believe the basic market demand will be met by June 1, 1999; the standard is therefore commercially feasible at that time. The staff found that there are a few hairspray products currently available in the marketplace, accounting for a small percentage of sales, that meet the 55 percent VOC standard. In addition, the timelines and other information provided by manufacturers on their research and development efforts make it clear that companies will be ready to market complying products by the proposed amended date of June 1, 1999, ensuring that the basic market demand for hairsprays will be satisfied. As mentioned previously, based on information from manufacturers, we believe that at least 30 percent of the market will be able to comply by June 1, 1999, and, we believe, this percentage will increase significantly over the next two and one-half years as manufacturers share their technologies and work to expedite their research and development efforts.

We also acknowledge that there are some manufacturers that have told us they will need time beyond June 1, 1999. These are typically manufacturers that rely on others to develop the basic complying formulation which they then tailor to their customers needs. We believe, that with the proposed time extension, raw material suppliers will be able to complete development of complying prototype formulations for use by these manufacturers. We also believe that there will be opportunities for technology sharing between manufacturers. However, in the event that some manufacturers will need additional time, the variance provision is available to deal with this on a case-by-case basis.

What technologies are available today which will enable manufacturers to reformulate their products by June 1, 1999?

There are several technologies available that will enable manufacturers to comply by June 1, 1999 for both aerosol and pump hairspray products. These technologies allow compliance with the regulation by either meeting the VOC standard or by introducing an innovative product via the innovative product provision in the regulation. The innovative product provision allows manufacturers to introduce a product that exceeds the VOC limit provided they can demonstrate that due to some unique packaging or formulation characteristics, the product emits less VOC emissions than a product that meets the standard.

Examples of reformulation options available for aerosols include the replacement of hydrocarbon propellant with HFC-152a (a non-VOC propellant) resulting in an anhydrous formula or developing formulas with increased water content in conjunction with a combination of various resins and propellants compatible with the increased water content. Examples of reformulation options that can be considered for pumps include replacing a portion of the VOC with water along with improved resins that tolerate the additional water or development of an innovative product. In most cases, manufacturers that are reformulating to the lower VOC products by increasing the water content, require resins (the active ingredient in a hairspray that "holds" the hair in place) that can tolerate this increased water content. Based on our discussions with industry representatives and review of the technical literature, it is apparent that diligent efforts by the resin suppliers have resulted in improved resins and understanding of emulsion systems that will help meet this need.

This is a simplified summary of a very complex subject and a more detailed discussion of the reformulation options is provided in Volume II of this report.

What are the State Implementation Plan consequences if the 55 percent standard is postponed to June 1, 1999?

The ARB will still meet our SIP commitment for emission reductions from consumer products if the 55 percent VOC hairspray standard were to be postponed from January 1, 1998, to June 1, 1999. This change is consistent with our SIP commitment, which relies on the reduction from the 55 percent VOC standard beginning with the 1999 ozone season.

Many areas in California are relying on the emission reductions from hairsprays. For example, San Joaquin Valley and San Diego will rely on the reductions from the 55 percent VOC standard to demonstrate attainment for the federal ozone standard in 1999. Other areas will use the reductions to meet the rate-of-progress requirements for 1999 and future years. The statewide emission reductions from the 55 percent standard attributed to hairspray is approximately 14 tons/day.

What are the proposed reporting requirements for hairspray manufacturers?

We are proposing that each hairspray manufacturer submit plans demonstrating progress

toward compliance to the Executive Officer outlining the specific steps they will take in developing complying products and the timeframe. These plans are due on or before January 1, 1998 and would be submitted by those manufacturers selling hairspray formulas in California with VOC contents greater than 55 percent VOC during the period from January 1, 1998 to June 1, 1999. In addition to the initial plan, under this proposal, the manufacturers would also submit periodic progress updates on their plans that would be required on a more frequent basis as the June 1, 1999 compliance date approaches. The ARB staff will use the compliance plans and updates to help track the individual manufacturers' progress toward compliance. This requirement is not intended to create a significant additional burden on the industry and we will work closely with industry over the upcoming months to develop a guidance document that identifies the information that the ARB staff would like to see included in these plans. Also, to the extent that some manufacturers may seek a variance from the June 1, 1999 date, these reports will help staff in evaluating if the criteria for a variance have been met (i.e. whether compliance with the 55 percent standard is beyond the manufacturer's reasonable control).

How is the variance provision proposed to be modified to require VOC emissions mitigation?

The proposed amendment will modify the variance provision to require mitigation of excess VOC emissions for manufacturers seeking variances for hairsprays after June 1, 1999. Hairspray manufacturers requesting a variance will also need to provide a plan for mitigation when submitting their variance application. The proposed amendment will also provide the Executive Officer with the flexibility to waive all or part of the mitigation requirement in the event it would cause extraordinary economic hardship on the applicant or for other good cause (e.g. such as a request for a very short variance period). This amendment is being proposed because hairsprays are responsible for a significant portion of the consumer products emissions and the potential exists that the projected emission reductions in the SIP could be compromised in the event manufacturers request and are granted variances after June 1999. This proposed amendment would ensure the SIP remains intact and would be an incentive for manufacturers to come into compliance in a timely manner. We also believe this requirement is responsive to those manufacturers that do comply by June 1, 1999. Our goal in implementing this proposal is to have a variance mitigation program for hairsprays that is flexible, workable, and fair.

Prior to early 1998, ARB staff will work with industry to develop guidance on possible ways to mitigate emission during a variance. It is our desire to have flexibility for manufacturers when choosing mitigation options and we envision that the choices for mitigation would include a wide variety of options such as generating credits by reformulating another product to a lower VOC content, buying credits from another manufacturer, or the open market. We will also explore mitigation fees as another option. As part of this, we will evaluate a phased mitigation fee. The concept is that the mitigation fee would be tied to the length of time requested for the variance. In the event a mitigation fee is used by an applicant, we envision one option being that these monies would be used to obtain emission reductions, such as vehicle scrappage.

We also expect that should a manufacturer seek a variance, that a variance may not be needed for all of a manufacturer's hairspray products. The variance process has the flexibility to tailor the variance for only those products for which a manufacturer is having a compliance problem. For example, a manufacturer may be able to comply with the June 1, 1999 date for aerosol products, but may need additional time for pump products.

What is staff's proposal for an early reduction credit program?

We are proposing to work over the upcoming year with industry representatives to develop an early reduction credit program. Our goal with this program is to provide an incentive for manufacturers to come into compliance early and to reward those manufacturers that do develop 55 percent VOC hairspray products by January 1, 1998. We envision that credits generated by a manufacturer could be used in a variety of ways such as using them to obtain additional time to comply with another product standard, selling them to other companies needing to mitigate emissions under a variance or selling them in the open market (to non-consumer product sources). In order to successfully develop this program, many details need to be discussed such as the lifetime and value of the credits, and how we can assure that the credits are real, enforceable, and quantifiable.

What are the expected environmental impacts from the proposed amendments to the regulation?

We have determined that the proposed modification allowing hairspray manufacturers additional time to develop 55 percent VOC hairspray formulas may have an adverse environmental impact. Because we are postponing the 55 percent VOC standard to June 1, 1999 from January 1, 1998, the reductions in emissions will be deferred about 17 months. It is worth reiterating that the total expected emission reductions from the 55 percent VOC hairspray standard are not being forgone and will be realized by June 1, 1999.

There are considerations, however, that override any adverse environmental impacts that may occur as a result of this amendment. As mentioned previously, this amendment to extend the standard effective date 17 months is intended to preserve the commercial feasibility of the standard by providing industry with additional time to successfully solve technical problems associated with reformulation and to develop, test, manufacture, and bring to market a commercially viable 55 percent VOC aerosol and pump hairsprays. In the absence of this time extension, most manufacturers would experience adverse economic impacts and the potential exists for disruption to the hairspray market. This amendment will provide the time needed by manufacturers to develop consumer-accepted products, and minimize adverse impacts on the marketplace. Because of this, we believe that these considerations override any adverse environmental impacts that may occur in the near term as a result of these amendments.

What are the expected economic impacts from the proposed amendments?

Overall, the staff expects most manufacturers or marketers of hairspray products to benefit from the proposed amendments because of the greater amount of time those companies will have to meet the 55 percent VOC standard. However, some raw material suppliers and at least one manufacturer may be adversely impacted by the proposed amendments because they may not realize the return on their investment as soon as they had planned. For example, one raw material supplier has indicated that the proposed extension for the compliance date would result in idling a recently completed plant, consequently leading to a substantial annual revenue loss. In addition, a manufacturer that claims to have 55 percent VOC technology available for licensing may not realize income from potential licensing agreements as hoped. These two companies are located outside of California. Thus, we do not expect their loss of profit to cause a significant change in California employment, business creation or expansion, and competitiveness with businesses outside of California. In addition, we expect the early reduction credit program and the variance mitigation provision to help offset these adverse impacts.

Our analysis shows that the cost-effectiveness of the 55 percent VOC standard compares favorably with the cost-effectiveness of the Phase I-II consumer products regulation and other ARB regulations. We calculate an incremental cost-effectiveness (current 80 percent VOC to 55 percent VOC) ranging from $0.50 to $3.80 per pound of VOC reduced, with an average of $2.25 per pound of VOC reduced. The average incremental cost-effectiveness compares favorably with the $1.70 per pound of VOC reduced previously reported as the overall cost-effectiveness for the Phase I-II regulation. Also, this cost compares favorably with other stationary and mobile source VOC regulations that have cost- effectiveness values for VOC regulations ranging from $0.05 to $6.00 per pound.

Predicting the retail price consumers will encounter is beyond the scope of our analysis and is highly unpredictable due to competitive forces in the consumer products market. However, we did evaluate the potential impacts on production costs due to changes in raw materials likely to be used in compliant 55 percent VOC formulations. An analysis of the potential raw material cost changes provides the best available indicator of possible retail price changes (assuming some or all of the cost changes are passed on to the consumer). Our analysis indicates that raw material changes for complying with the 55 percent standard (relative to current 80 percent or pre-regulatory costs) can result in a cost savings of about $0.10 per unit to a cost increase of about $0.35 per unit for low-cost products (e.g., those with retail price of about $1.00 per unit). For medium-high priced products, we are projecting a raw materials cost savings of about $0.10 per unit to a cost increase of about $0.45 per unit. To the extent that manufacturers pass these cost savings or increases to consumers, the final retail price may be higher or lower than indicated by this analysis. Of note is that some manufacturers have

indicated that their reformulation objectives are to meet the 55 percent standard without an increase in price for their products.

What has been industry's response to the ARB staff proposal?

Many parties have been actively involved in our assessment. They include members of CTFA, the DuPont Company (DuPont), IQ Holdings Incorporated (IQ Holdings) and the National Aerosol Association. Overall the response to our proposal has been mixed. Originally CTFA requested postponement of the 55 percent standard until January 1, 2002 but recently they have indicated July 1, 2000 would be acceptable. They do not believe the 17 month extension will provide sufficient additional time for all their members. In support of their request, the CTFA has submitted data to substantiate their claim that the emission reduction goal in the SIP for hairsprays has already been achieved. The CTFA claims that, because of reduced hairspray sales in California over the past few years, the emissions from this category have decreased to a level below the SIP emission reduction goal for hairsprays. This is discussed more fully under the following question, "Have hairspray VOC emissions decreased in California?"

DuPont, a supplier of HFC-152a and IQ Holdings, a hairspray manufacturer, on the other hand, have encouraged staff to propose no extension of the standard. Both of these companies have expended considerable resources with the January 1998 date in mind and are concerned that they will lose an opportunity to gain a fair return on their investments in the event an extension is granted. DuPont is a major supplier of two propellents, HFC-152a and dimethyl ether (DME), with significant potential use in 55 percent VOC aerosol hairspray. While the availability of HFC-152a was uncertain until late 1995, DuPont now claims to be in a position to provide sufficient HFC-152a to meet the hairspray market needs. IQ Holdings is a manufacturer who has stated that they have a 55 percent VOC aerosol and pump formulation that can be marketed by January 1998. IQ Holdings has offered to license their technology to other manufacturers.

Have Hairspray VOC emissions decreased in California?

An analysis submitted by the CTFA suggests a decrease since 1990 in California hairspray sales. The CTFA claims that, because of the decrease in sales and resultant emissions, the second-tier (55 percent VOC) standard can be delayed without compromising the emission reductions committed to in the SIP for hairsprays.

At this time, we cannot fully verify CTFA's data. Hairspray sales data from recent years suggest that there probably has been some reduction in emissions due to hairspray sales trends. However, the magnitude of the apparent reduction in sales and emissions, if any, may not be as large as suggested by the CTFA analysis. This is because the sales data provided by CTFA do not include data for warehouse clubs, salons, beauty supply stores and other outlets.

While the information on hairspray sales trends and emissions is valuable for emissions inventory purposes, we believe, it is not a basis upon which to decide on a time extension. We believe that decisions regarding the level and timing of standards should be based upon technical and commercial feasibility considerations.

We believe that sales/emissions growth data are best used for updating the SIP inventory, and we are appreciative to CTFA for providing this information to us. Once verified and accurately quantified, permanent changes in sales translated into emissions growth trends are useful for adjusting the SIP inventory to reflect the most up-to-date information available. We are continuing to work with CTFA to reach consensus on hairspray sales trends. These data will assist us in updating our emission inventory for this category.

What are ARB staff's plans for the future with regards to these amendments?

Over the upcoming year we intend to work closely with industry to develop guidance for the new reporting requirements, develop an early reduction credit program, and prepare variance guidance for hairspray manufacturers required to mitigate emissions in the event a variance is pursued. We plan to schedule an initial meeting with industry prior to the March Board hearing to exchange our preliminary thoughts on these three areas.

The proposed requirement for a plan reporting on compliance progress with periodic updates is intended to help us monitor industry's progress toward compliance with the standard. As stated earlier, it is not intended to create significant additional burdens on industry. With this in mind, we will develop guidelines to ensure uniform and simplified reporting of information and that specify only that information which is necessary for us to monitor progress. We plan to develop this guidance by late summer or early fall 1997 so that it will be available for manufacturers to prepare their initial compliance plans no later than January 1, 1998.

The early reduction credit program (ERCP) is intended to reward manufacturers for early compliance with the proposed June 1, 1999 standard date. Over the upcoming year, we will work with industry to develop an ERCP that would allow manufacturers to obtain early reduction credits during the time period from January 1, 1998 to June 1, 1999. We envision that the reduction credits could be used in a variety of ways such as to obtain additional time to comply with upcoming standards for other products, sell to other companies, and sell in the open market. However, there are also important key points in this program that must be considered to ensure that any such credits earned or traded can be accurately and quantitatively tracked. At our meeting with industry prior to the March Board hearing we will explore various aspects of the ERCP including how credits can be generated and used, and credit lifetimes.

The proposed requirement for variance mitigation reflects our desire to recognize those manufacturers that do comply by June 1, 1999 and to provide that any excess VOC emissions by a manufacturer granted a variance are mitigated. To assist those manufacturers that may have to mitigate emissions, we will develop guidelines that will provide manufacturers flexibility by identifying options for mitigating their excess emissions. It is our intention to develop the variance mitigation guidelines by early 1998 so manufacturers will be fully aware of what to expect should they need to seek a variance.

Are there any comparable Federal regulations that regulate hairsprays?

Yes. On April 2, 1996, the U.S. EPA published a proposed rule, the National Volatile Organic Compound Emission Standards for Consumer Products. This regulation is similar to the ARB's consumer products regulation, however there are some differences. Like the ARB rule, the proposed rule specifies VOC standards for a variety of consumer products, including hairsprays. However, the proposed rule does not include the second tier or "future effective" standards. All of the VOC standards in the proposed rule are effective on September 1, 1996. Another difference is that the California Regulation allows for three years to sell-through non-compliant products whereas the federal rule allows for unlimited sell-through.

III.

RECOMMENDATIONS

We recommend that the Board approve the proposed amendments to the consumer products regulation and direct the Executive Officer to work with the industry and others to develop the credit program, variance, and compliance plan guidelines.

VOLUME II: TECHNICAL SUPPORT DOCUMENT

I.

INTRODUCTION

A. OVERVIEW

In Volume II of the Initial Statement of Reasons (ISOR) for Proposed Rulemaking - Technical Support Document (TSD), we present our technical justification and analysis of the proposed amendments pertaining to the 55 percent VOC hairspray standard. The discussion regarding our proposed amendments affecting hairsprays is presented in Chapter II, "Description of the Proposed Amendments." Chapter III includes a summary of the progress manufacturers have made toward meeting the future effective standard for hairspray. Chapter IV provides a discussion of our findings with regard to the time required to develop a commercially viable hairspray product. And finally, Chapter IV provides the environmental, economic and SIP impacts analyses for the proposed amendments.

B. CONSUMER PRODUCTS REGULATIONS - HISTORY AND STRUCTURE

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

The CCAA added section 41712 to the California Health and Safety Code (HSC) which, along with subsequent amendments, requires the ARB to adopt regulations to achieve the maximum feasible reduction in volatile organic compounds (VOCs) emitted by consumer products. In 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 regulations.

In part, to fulfill the requirements of the Act as it pertains to consumer products, on October 11, 1990, the ARB adopted a comprehensive regulation for reducing VOC emissions from 16 categories of consumer products (ARB, 1990a; ARB, 1990b; ARB, 1990c). This rulemaking, known as "Phase I," contains the first-tier and second-tier VOC standards for the hairspray category. On January 9, 1992, the ARB adopted VOC standards for 10 additional categories of consumer products (ARB, 1991a; ARB, 1991b; ARB, 1991c; ARB, 1992). This rulemaking is known as "Phase II." Both phases comprise the "consumer products regulation" for 26 categories (sections 94507-94517, Title 17, California Code of Regulations (CCR)).

For the hairspray category, two tiers of standards were adopted: an 80 percent and 55 percent VOC limit, effective January 1, 1993, and January 1, 1998, respectively. At the time of its adoption, the Board determined the regulation was technologically and commercially

feasible. However, the Board also acknowledged the challenges hairspray manufacturers might encounter when developing low-VOC hairsprays to meet the standard. Therefore, the Board also directed the ARB staff to monitor and provide periodic reports on industry's progress in meeting the future effective 55 percent VOC standard.

Although the consumer products regulation employs a traditional regulatory approach, it also provides flexibility to manufacturers. First, the regulation specifies performance standards which must be met, but does not specify how products are to be reformulated to meet the standards. Manufacturers are free to meet the VOC content limits however they choose, provided that their products do not exceed the limits.

Moreover, the regulation provides additional flexibility through the Innovative Products Provision. This provision allows the sale of products which exceed the VOC limits but through special formulation or packaging emit less VOCs than a representative product which meets the applicable limit.

To provide even greater flexibility, the ARB adopted the Alternative Control Plan (ACP) regulation (ARB, 1994a; ARB, 1994b) and is contained in sections 94540-94555, Title 17, CCR. This regulation provides manufacturers subject to the Phase I and II regulations with alternative means to comply with the regulations. The ACP is a voluntary, market-based regulation which enables manufacturers to comply with the consumer products regulation by establishing an emissions “cap” or “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 or emissions from each individual product. As such, the ACP supplements the existing regulations, providing an unprecedented level of flexibility to participating manufacturers. By design, the ACP provides this additional flexibility while also being equivalent to the existing regulations in reducing emissions.

The State Implementation Plan

On November 15, 1994, the ARB adopted the State Implementation Plan (SIP) for ozone. The SIP serves as California's overall long-term plan for the attainment of the federal ambient air quality standard for ozone. Achieving significant VOC reductions from consumer products is a key element of the SIP. Together with significant reductions from stationary industrial facilities, mobile sources (e.g., cars, trains, boats), and other area sources (e.g., architectural and industrial maintenance coatings), the reductions in the consumer products element of the SIP are an essential part of California's effort to attain the air quality standards for ozone. The VOC reductions from consumer products are also needed to help several local air pollution control districts meet rate-of-progress requirements in the federal Clean Air Act (CAA).

The consumer products component of the SIP is a multi-faceted program comprising “near-term,” “mid-term,” and “long-term” control measures. The near-term SIP measures comprise our existing consumer products regulations. The mid-term measures consist of

regulations to cover additional product categories not currently subject to the existing regulations. The long-term measures rely on new technologies with components of market incentives and consumer education.

In the SIP, the ARB has committed to an overall 85 percent reduction in consumer product emissions by the year 2010 (including the adopted regulations). This reduction is necessary for the South Coast Air Basin, among others, to attain the federal ozone standard and meet the rate-of-progress requirements under the CAA. Under the SIP, the various control measures will contribute the following emission reductions:

30 percent will come from the near-term measures,
25 percent will come from the mid-term measures,
30 percent will come from the long-term measures.

On November 15, 1994, the ARB submitted the consumer products Phase I and II regulations and the antiperspirant and deodorant regulation (sections 94500-94506.5, Title 17, CCR) to the United States Environmental Protection Agency (U.S. EPA) for approval as a SIP revision. On January 13, 1995, the U.S. EPA determined the submittal to be complete and approved the regulations on February 14, 1995. The U.S. EPA's approval of the consumer products regulations was published in the Federal Register on August 21, 1995.

C. COMPARABLE FEDERAL REGULATIONS

The U.S. EPA recently published a proposed rule, National Volatile Organic Compound Emissions Standards for Consumer Products, which appeared in the April 2, 1996, Federal Register (Vol. 61, No. 64, pages 14531-14543). This regulation is similar to the ARB's consumer products regulation, although some differences do exist. The proposed rule specifies VOC standards for hairsprays and other consumer products. The U.S. EPA's proposed 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 several product categories which are regulated under the ARB regulation. All of the VOC standards in the U.S. EPA's proposed rule have a standard effective date of September 1, 1996, whereas the VOC standards in the ARB regulation are phased in at various dates from 1993 to 1999. Unlike the ARB regulation, the U.S. EPA's proposed rule does not have a second-tier of "future effective" VOC standards for any product category, including hairsprays. Finally, the U.S. EPA's proposed rule has an unlimited "sell-through" period for noncomplying products manufactured before the effective date of the standards, whereas California law allows a three-year sell-through period.

Whenever possible, the ARB strives to harmonize its rules with federal regulations addressing the same issues. However, Phase I of the ARB consumer products regulation has been in existence since 1990, and Phase II was adopted by the Board in 1992. Both phases therefore

predate the proposed U.S. EPA regulation by several years. Additionally, the proposed U.S. EPA regulation is less effective in reducing emissions than is the ARB regulation in several areas. Consequently, amending the California consumer products regulation to eliminate conflict with the U.S. EPA's regulation would reduce the air quality benefits of the regulation and would significantly change the rules in California after manufacturers have expended significant resources to comply with them. In summary, given the serious nature of the air pollution problem in California, the benefit to human health and the environment justifies a California consumer products regulation that results in greater emissions reductions than would the proposed U.S. EPA regulation.

D. TECHNICAL ASSESSMENT

At the Phase I and II consumer products regulation adoption hearings, the Board directed the Executive Officer to consult with the consumer product manufacturers who must achieve the future effective VOC limits and to report to the Board on the manufacturers' progress (in Board Resolutions 90-60 (Appendix A) and 92-1, respectively). These reports are intended to identify any significant problems with achieving the future effective standards on time and propose any regulatory modifications that may be appropriate. The Board directed the Executive Officer to consult the regulated public and any other interested parties in preparation of the reports and to provide these interested parties an opportunity to make verbal and written comments to the Board in conjunction with these reports.

To date we have provided the Board with reports on our assessment of manufacturers progress in meeting the future effective standards for single-phase aerosol air fresheners, engine degreasers, “all other forms” glass cleaners, nail polish removers, automotive brake cleaners, aerosol dusting aids, fabric protectants, and aerosol adhesives. For this report, we have completed a comprehensive analysis of the ability of manufacturers to meet the second-tier 55 percent VOC hairspray standard which will become effective on January 1, 1998. Based on our analysis we concluded that the 55 percent VOC standard is indeed technologically feasible. However, additional time to June 1, 1999 is needed by manufacturers to complete product development and testing to ensure that the 55 percent VOC hairspray formulas will meet customer performance expectations. While we believe most manufacturers will be able to comply given this additional time, and that the basic market demand for hairsprays will be met, we do expect that some manufacturers will request variances for additional time beyond the June 1, 1999 date. Our technical analysis and findings are summarized in the following chapters.

In the future we will provide the Board with our assessment of manufacturers’ progress in meeting the future effective standards for crawling bug insecticides and personal fragrance products.

References and Bibliography:

Air Resources Board, Staff Report - Proposed Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products, August, 1990a.

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

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

Air Resources Board, Staff Report - Proposed Alternative Control Plan Regulation for Consumer Products, August, 1994a.

Air Resources Board, Final Statement of Reasons for Rulemaking: Public Hearing to Consider the Adoption of the Alternative Control Plan Regulation for Consumer Products, September, 1994b.

United State Environmental Protection Agency, Federal Register - National Volatile Organic Compound Emission Standards for Consumer Products, April 2, 1996, Vol. 61, No. 64, pp. 14531-14543.

II.

DESCRIPTION OF THE PROPOSED AMENDMENTS

A. INTRODUCTION

This chapter provides a description of the proposed amendments to the hairspray standard and a short summary on the contributions hairsprays make to VOC emissions. The proposed regulatory amendments are included in Appendix B.

B. AMENDMENTS TO THE HAIRSPRAY STANDARD

Description of the Amendments:

We are proposing several amendments that will affect the hairspray category. We are proposing these amendments to address technical difficulties manufacturers have experienced in meeting the 55 percent VOC standard by January 1, 1998. Based on our technical analysis, which includes extensive input from individual manufacturers, we believe that, overall manufacturers cannot produce consumer-acceptable 55 percent VOC hairspray formulas by January 1, 1998. Even though manufacturers have invested significant research and development funds toward the development of 55 percent VOC products, and substantial progress has been made, additional time is needed to address technical problems such as slow dry times and excessive initial curl droop, develop and refine prototype formulations, and conduct test marketing of their products. We believe the proposed amendments will address these concerns while still requiring expeditious compliance.

Our primary goals in developing the proposed amendments are identified below:

- identify the earliest practicable date by which the 55 percent standard can be found to be both technologically and commercially feasible;
- preserve projected emission reductions from consumer products, as required by the SIP;
- provide an incentive for manufacturers to comply early;
- make it advantageous for manufacturers to take all reasonable steps to comply within any extended timeframe; and,
- provide a mechanism to closely track manufacturers' progress toward compliance.

The proposed amendments are described below.

Postpone the Effective Date of the Standard:

We are proposing to amend the Table of Standards to extend the effective date of the 55 percent VOC standard from January 1, 1998 to June 1, 1999. Based on our discussions with hairspray manufacturers, we believe that the manufacturers will not have commercially-marketable 55 percent VOC formulas ready by the current compliance date of January 1, 1998. Developments in new resin technologies and the supply of propellant systems have only recently allowed manufacturers to formulate realistic 55 percent VOC-compliant prototypes. Thus, despite having eight years from the rule adoption to develop 55 percent VOC products (five of those after the first-tier standard became effective in 1993), manufacturers are only now reaching the point where they are close to developing final prototypes for commercially-marketable 55 percent VOC products. Since extensive product testing and refinements are necessary to develop these prototypes into commercially-acceptable products, we believe manufacturers will need additional time beyond 1998.

Prior to 1993, manufacturers were primarily focused on meeting the first-tier, 80 percent VOC standard. Since nearly all products before then were anhydrous (containing little or no water), the industry embarked on developing water-based, 80 percent VOC products with which few of the manufacturers had any previous experience in developing and marketing. By most accounts, they were able to reformulate their products to meet the standard while achieving performance and cost goals consistent with the pre-regulatory products. These reformulations were generally achieved by using existing resin technologies, designed for anhydrous systems, with formulations that could tolerate the low levels of water in 80 percent VOC products.

After 1993, the industry began investing significant resources and time in developing products to meet the second-tier, 55 percent VOC standard. To meet this standard, manufacturers had to consider approaches that required new innovations and formulation technologies. However, new high-water compatible resins, necessary for meeting the more challenging second-tier standard, were not developed at a pace sufficient to enable manufacturers to meet the current January 1998 standard. Resin suppliers, both existing and new companies, are working closely with hairspray manufacturers to develop suitable resin systems. When industry became convinced that they would not be able to comply with the January 1998 compliance date, they approached us in the fall of 1995 to discuss a time extension date. During our discussions with industry, CTFA informed us that manufacturers and resin suppliers have collectively spent on the order of $50 million to develop 55 percent VOC hairspray products. In addition, DuPont, a propellant supplier of HFC-152a (non-VOC) and dimethyl ether, informed us they have invested approximately $50 million to expand their production capacity of both propellants.

One of the major challenges the industry has encountered is developing a 55 percent VOC formula that has comparable performance characteristics to an 80 percent VOC formula. The ability to do this is key to a manufacturer’s ability to retain customer loyalty and avoid customer complaints, and to preserve brand name integrity. To determine the need for an appropriate time extension, staff worked closely with industry and requested information on individual manufacturers' research and development efforts. We found that a typical timeline that can be followed when developing a 55 percent VOC hairspray requires about three and one-half years,

assuming manufacturers begin research on promising 55 percent VOC formulations by early 1996.

Based on compliance timelines and testing data submitted by various manufacturers, we believe that an extension of time is warranted and that by June 1, 1999 manufacturers will be able to develop, begin to manufacture, and bring to market commercially acceptable hairspray products using a variety of technologies available to formulate compliant hairsprays. This is further supported by data supplied by manufacturers representing at least 30 percent of the market demonstrating that they will, provided all goes well, have compliant products ready by the second quarter, 1999. We also believe that by 1999 this percentage will increase significantly as the technology is shared between manufacturers and the proposed regulatory incentives encourage other manufacturers to streamline and expedite their efforts. Further justification for this time extension is based on one of the more promising technologies that can be used to develop a 55 percent VOC hairspray. This approach relies on the non-VOC propellent, HFC-152a (1,1-difluoroethane). While using HFC-152a is one of the more viable approaches for aerosol hairsprays, manufacturers stated that they were hesitant until only recently to seriously consider this option. This is in part due to the fact that it was only in late 1995 that manufacturers were assured of the supply of HFC-152a, hence research and development efforts using this propellent were only seriously undertaken in late 1995 or early 1996. The additional proposed 17 month extension will provide the necessary time to complete the development of commercially feasible aerosol hairsprays using HFC-152a. In addition, there is one company, IQ Holdings, Incorporated that has stated they have a proprietary technology and have offered to license their technology to other manufacturers. Manufacturers could license this technology and then optimize the formula to meet their customers needs. This too, we believe, could be accomplished within the timeframe proposed.

Reporting Requirements:

We are proposing that individual hairspray manufacturers submit plans demonstrating progress toward compliance to the Executive Officer that outlines the specific steps they will take in developing complying products by June 1, 1999. These plans would be due on or before January 1, 1998, and would be submitted by those manufacturers selling hairspray formulations with VOC contents greater than 55 percent during the period from January 1, 1998 to June 1, 1999. To enable us to track compliance, the compliance plans would provide specific details on reformulation efforts such as formulation development steps, performance evaluation of prototype formulas, consumer and safety evaluation, plant modifications, and final product development plans.

In addition to the initial plan, manufacturers would submit periodic progress updates on their plans every three months until December 1998, and bi-monthly thereafter until June 1, 1999. This amendment is not intended to create significant additional burdens on the industry, but rather to help us monitor individual manufacturer's progress toward compliance with the 55 percent VOC standard. Also, to the extent some manufacturers may seek a variance from the June 1, 1999, date, these reports will help us in evaluating if the basis for a variance is beyond the

manufacturers reasonable control. We intend to work closely with industry to develop a guidance document to assist manufacturers when preparing their compliance plan submittal. We intend to complete this process by late summer or early fall 1997 to allow manufacturers adequate time to prepare their compliance plans.

Variance Mitigation:

We are proposing to modify the variance requirements to allow the Executive Officer to require manufacturers that are granted variances for hairsprays after June 1, 1999, to mitigate the excess emissions generated during the duration of the variance. Hairspray manufacturers requesting a variance will need to provide a plan for mitigation when submitting their variance application. The proposed amendment will also provide the Executive Officer with the flexibility to waive all or part of this requirement in the event it would cause extraordinary economic hardship on the applicant or for other good cause (e.g., such as a request for a very short variance period). This amendment is being proposed because hairsprays are responsible for a significant portion of the consumer products emissions and the potential exists that the projected emission reductions in the SIP could be compromised in the event manufacturers request and are granted variances after June 1999. This proposed amendment would ensure the SIP remains intact and would be an incentive for manufacturers to come into compliance in a timely manner. We also believe this requirement is responsive to those manufacturers that do comply by June 1, 1999. Our goal in implementing this proposal is to have a variance mitigation program for hairsprays that is flexible, workable, and fair.

Prior to early 1998, ARB staff will work with industry to develop guidance on variance mitigation. It is our desire to have flexibility for manufacturers when choosing mitigation options and we envision that the choices for mitigation would include a wide variety of options such as generating credits by reformulating another product to a lower VOC content, buying credits from another manufacturer, or the open market. We will also explore mitigation fees as another option. As part of this, we will evaluate a phased mitigation fee. The concept being that the mitigation fee would be tied to the length of time requested for the variance. In the event a mitigation fee is used by an applicant, we envision one option being that these monies would be used to obtain emission reductions, such as vehicle scrappage.

Early Reduction Credit Program:

In addition to the amendments described above, we are proposing to develop an early reduction credit program (ERCP) to reward manufacturers for early compliance with the June 1, 1999, standard date. We will develop this program to provide an incentive to manufacturers to come into compliance early and to reward manufacturers that have put forth diligent efforts to develop complying products by January 1, 1998. We envision that participants in the ERCP could use the credits in several ways. Possible ways credits could be used are to: (1) obtain additional time to comply with standards for other products; (2) sell to other companies; and (3) sell in the open market (including mobile sources, stationary sources, and area sources, as

the credit program allows).

While we want to provide as much flexibility as possible in the credit program, there are important points which must be fully discussed and evaluated before it could be implemented. These include, but are not limited to, the following: any ERCs generated should result from emission reductions beyond those required by federal, state, and local laws or regulations (surplus); any ERCs generated or traded must be real, enforceable, and quantifiable to a reasonable degree of certainty; and any ERCs generated by reducing the VOC content in hairsprays must be from those hairsprays that comply with the existing 80 percent VOC standard. These and other important points such as the credit lifetime must be considered to ensure accurate tracking of any credits earned or traded. Over the next year, we will work with industry to develop an ERCP and propose any regulatory changes necessary to the consumer products regulations. We intend to conduct an initial discussion meeting on the ERCP as well as the variance and compliance plan guidance prior to the March 27, 1997 Board hearing.

C. PRODUCT DESCRIPTION AND EMISSIONS FROM HAIRSPRAYS

Hairsprays are aerosol or pump products designed for dispensing droplets of resin (film forming polymer) on and into the hair coiffure to enable users to keep their hair in position for a period of time. The key ingredients in hairspray formulations are resins, solvents, propellents (for aerosols) and miscellaneous other ingredients such as neutralizers, fragrances, and plasticizers. Of these, the propellent and solvents are the main contributors to VOC emissions. Hairsprays are used by household consumers as well as in commercial establishments such as hair styling salons.

According to our Consumer Products Registration Database, there were 78 hairspray manufacturers or marketers selling hairsprays in California in 1990. The majority of these manufacturers are located outside of California with 33 companies located in California. The manufacturers based outside of California are responsible for the majority of the market having approximately 80 percent of the market share. The 33 companies that are located in California have a combined 17 percent share of the total California market, based on the ARB Consumer Products Registration Database. Aerosol hairsprays were the slightly more popular form in 1990 having about a 59 percent share of the total California market.

Hairsprays are a significant source of VOC emissions in California and are the largest single source of consumer product emissions, with 46 tons/day VOC emissions estimated for 1990 in the Technical Support Document (TSD) for the first phase of the consumer products rulemaking (ARB, 1990a; ARB, 1990b). Being the largest source of emissions, the emission reductions realized from this standard are significant. The 80 percent VOC limit results in approximately a 7.2 tons/day statewide reduction in VOCs. The 55 percent VOC limit will result in an additional 14 tons/day reduction. Both of these limits are now federally enforceable as part of the State Implementation Plan (SIP) since the consumer products regulation was approved as a SIP revision on February 14, 1995.

References and Bibliography:

Air Resources Board, 1990 Consumer Products Registration Database.

Air Resources Board, Staff Report - Proposed Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products, August, 1990a.

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

III.

TECHNICAL ASSESSMENT FOR HAIRSPRAYS

A. PROCESS FOR GATHERING DATA

In evaluating manufacturers' progress in developing 55 percent VOC hairspray formulations, we compiled data from various sources including telephone contacts, individual company meetings, workshops, correspondence, trade journals, books, patents, and the Consumer Products Registration Database. The CTFA and National Aerosol Association also provided us with technical data.

The Consumer Products Registration Database was valuable in supplying ARB staff with contacts for hairspray manufacturers. This database contains the names, locations, and telephone numbers for 78 hairspray manufacturers, which were used to contact manufacturers to inquire on the status and progress of their efforts to reach the upcoming 55 percent VOC limit for hairspray. These manufacturers are listed in Table III-1.

Through individual meetings or telephone conversations with various companies, we were able to gather information on individual manufacturer's efforts in developing 55 percent VOC hairsprays. We contacted 48 hairspray manufacturers and nine raw material suppliers during our evaluation. In our telephone calls and individual company meetings, we asked manufacturers several questions to assist us in assessing their progress: 1) their efforts to reformulate their products; 2) the technology to be used when developing lower VOC formulations; 3) the most important physical properties or parameters to consider to maintain performance; 4) when they will have formulations available to comply with the 55 percent VOC standard; and, 5) the cost impacts associated with their product reformulation. Included in the above contacts are the National Aerosol Association and CTFA Hairspray Group member companies which met with ARB staff on October 19, 1995, and periodically thereafter.

Two public workshops were conducted to provide a forum for discussing the progress and challenges toward the development of a viable 55 percent VOC hairspray. The first workshop was held on April 30, 1996 (ARB, 4/30/96) and the second workshop was held on October 1, 1996 (ARB, 10/1/96). A draft staff analysis (ARB, 1996) and workshop notices were sent to over 3000 interested and affected parties and were made available on the Internet. The workshops were attended by over 50 representatives from the hairspray industry.

Technical reports and articles found in industry trade journals and other literature were reviewed. A list of the trade journals and printed literature used by staff in developing this report is presented in Table III-2. In addition, the CTFA Hairspray Group provided us with technical discussions on hairspray formulations during meetings and public workshops at the ARB headquarters in Sacramento (Table III-3).

Finally, a search of the patent literature provided useful data on recent patents for 55 percent VOC hairspray formulations. Only those patents that were assigned in 1992 or beyond were considered. Nineteen patents were found that addressed 55 percent or lower VOC hairspray formulations. These patents are identified in Table III-4.

TABLE III-1.
HAIRSPRAY MANUFACTURERS REPORTING INFORMATION
IN THE CONSUMER PRODUCTS REGISTRATION DATABASE

Company Names

Aerosol Services Company, Inc/Nexxus Pro*
Amway Corporation
Calvin Klein Cosmetics Company
Chuckles, Incorporated
Clairol Incorporated
Conair Corporation
Cosmosol, LTD
The Dial Corporation
E T Brown Drug Company, Incorporated
Focus 21 International*
Gelle' International, Ltd. (Key Distrib)*
The Gillette Company
Goldwell Cosmetics (USA), Incorporated
H2O Plus Inc/Hydrotech Labs
Helene Curtis, Incorporated
Image Laboratories, Incorporated*
John Frieda, Incorporated
Joico Laboratories, Incorporated*
Kenra Laboratories, Inc / Elasta Products
Key West Aloe, Incorporated
L'anza Research International, Incorporated*
Lander Company, Incorporated
M J Eckhard, Incorporated*
Mary Kay Cosmetics, Incorporated
Merle Norman Cosmetics*
National Aerosol Products Company*
NuSkin International
Penn Champ, Incorporated
Premiere Products, Incorporate*
Professional Choice Lab*
Redkin Laboratories*
Revlon, Incorporated
Salon Technology, Incorporated
SC Johnson & Son, Incorporated
Scruples Professional Salon Products
Shaklee U.S., Incorporated*
Target Stores
Vital Care of North America, Limited (Key D)*
WM Barr and Company, Incorporated
Alberto-Culver, Incorporated
Aveda Corporation
Chesebrough-Ponds USA Company
Claire MFG Co./Sprayaway Products
Compare Value Products*
Cosmair, Incorporated
DEP Corporation*
Dow Brands
Estee Lauder Companies
Gar Labs, Incorporated*
Georgette Klinger, Incorporated
Golden Sun, Incorporated*
Graham Webb International
Hair Muscle, Incorporated*
IQ Products Company/Formerly CSA Limited
Joed Cosmetics Research*
John Paul Mitchell Systems*
KMS Research, Incorporated*
Key Distributors, Incorporated*
L & F Products
La Costa Products International*
Longs Drug Stores*
Majestic Drug Company, Incorporated
Matrix Essentials, Incorporated
Modern Research*
Nexxus Products Company*
Pantresse, Incorporated
Peter Thomas, Incorporated*
Procter & Gamble Company
Promotional Products Development, Inc.*
Regis Corporation
Revlon-Realistic
Savon Division of American Drug Stores
Schwarzkopf, Incorporated*
Sebastian International, Incorporated*
St. Ives Laboratories*
Thrifty Corporation*
Wella Corporation, The
Zotos International, Incorporated

* Company located in California

TABLE III-2.
TRADE JOURNALS AND BOOKS

Drugs and Cosmetics Industry
Household and Personal Products Industry
Cosmetics & Toiletries Magazine
Spray Technology & Marketing
Chemical and Physical Behavior of Human Hair, Clarence R. Robbins, 1994 by Springer-Verlag New York, Incorporated
DuPont Dymel Aerosol Propellants, Dymel®/Aerosol Technical Course

TABLE III-3.
LIST OF MEETINGS WITH CTFA HAIRSPRAY GROUP

DATE	PURPOSE
October 19, 1995	Discussion on: (1) Presentation to C.A.R.B, 55% VOC Issues (2) 55% VOC Non Aerosol Hair Spray Presentation to the California Air Resources Board (3) 55% VOC Aerosol Hairsprays (4) Fundamental Challenges of 55% VOC Hairsprays (5) Low VOC Hair Spray Presentation to California Air Resource Board (6) Hairsprays
March 19, 1996	Discussion on: (1) Potential postponement of 55 percent VOC standard (2) Clarification of industry terms and concepts (3) Bifurcation and SIP issues (4) Manufacturers progress to comply with 55 percent VOC hairspray standard
April 30, 1996	Public workshop to discuss 1998 hairspray standard of 55 percent VOC
June 18, 1996	Discussion on hairspray sales data and trends
July 11, 1996	Discussion on: (1) Potential postponement of 55 percent VOC standard (2) Feasibility of bifurcation of aerosol and pump hairsprays (3) Availability of HFC-152a
October 1, 1996	Public workshop on technical assessment of 55 percent VOC standard for hairspray. Presentation and discussion on “CTFA Hairspray Presentation”

TABLE III-4.
HAIRSPRAY FORMULATION PATENTS MEETING THE 55 PERCENT VOC STANDARD

Ref #	Patent #	Date	Assignee	Title
1)	5,413,775	May 9, 1995	Amerchol Corporation	Hairsprays and Acrylic Polymer Compositions For Use Therein (P, A)*
2)	5,304,368	April 19, 1994	American Telecast Corporation	Non-Foaming, Non-Viscous, Alcohol-Free, Water-Based Pressurized Hair Spray Product (A)
3)	5,441,728	August 15, 1995	Chesebrough-Pond's, USA Company	Hairspray Compositions (P, A)
4)	5,266,308	November 30, 1993	Chesebrough-Pond's, USA Company	Hair Treatment Composition (P, A)
5)	5,314,684	May 24, 1994	Clairol, Inc.	Water-Based Fixative Composition (P)
6)	5,320,836	June 14, 1994	Eastman Kodak Company	Hair Spray Formulations Containing A Polyethylene Glycol Ester of Caprylic and Capric Acids (P, A)
7)	5,266,303	November 30, 1993	Eastman Kodak Company	Aerosol Hair Spray Formulations (A)
8)	5,286,477	February 15, 1994	Helene Curtis, Inc.	Aerosol Hair Styling Aid (A)
9)	5,164,177	November 17, 1992	Helene Curtis, Inc.	Aqueous Hair Styling Aid (P, A)
10)	5,326,555	July 5, 1994	ISP Investments, Inc.	Clear Hair Spray Composition Capable of Forming Low Tack Films Which Dry Rapidly (P, A)

Note: A = Aerosol, P = Pump

TABLE III-4. (cont.)
HAIRSPRAY FORMULATION PATENTS MEETING THE 55 PERCENT VOC STANDARD

Ref #	Patent #	Date	Assignee	Title
11)	5,275,811	January 4, 1994	ISP Investments, Inc.	Hair Spray Resin Composition (P, A)
12)	5,223,247	June 29, 1993	ISP Investments, Inc.	Hair Spray Composition Containing Water Soluble Alkylated PVP Copolymers as Hair Fixative Therein (P, A)
13)	5,221,531	June 22, 1993	ISP Investments, Inc.	Polymer Hair Fixatives, Aqueous-Based Solution Process for Making Same and Water-Based Hair Spray Formulations Therewith Which Meet VOC Standards (A)
14)	5,182,098	January 26, 1993	ISP Investments Inc.	Terpolymer Hair Fixatives, Aqueous Solution Process for Making Same and Water-Based Hair Spray Formulations Which Meet VOC Standards (A)
15)	5,160,729	November 3, 1992	ISP Investments, Inc.	High Water Content Hair Spray Composition (P, A)
16)	5,158,762	October 27, 1992	ISP Investments, Inc.	Water-Based Hair Spray Compositions Containing Multiple Polymers (P)
17)	5,126,124	June 30, 1992	ISP Investments, Inc.	Hair Spray Resin Composition (P, A)
18)	5,501,851	March 26, 1996	National Starch and Chemical Investment Holding Corporation	Emulsion Polymers for Use in Hair Fixatives (P, A)
19)	5,518,717	May 21, 1996	National Starch and Chemical Investment Holding Corporation	Hydrolyzed Zein as Hair Fixative in Hair Compositions (P, A)

Note: A = Aerosol, P = Pump

B. CURRENT STATUS OF REFORMULATION EFFORTS

This section describes the results of our contacts with manufacturers/marketers and raw material suppliers regarding their efforts to formulate commercially viable 55 percent VOC hairspray products. It also contains a summary of our review of the technical and patent literature regarding the possible resins and compositions that may be used by manufacturers to develop prototypical products.

Manufacturer Contacts:

We spoke with 48 companies regarding their progress to comply with the 55 percent VOC standard. Of these companies, we spoke with many of them on an individual basis as well as in group settings such as our meetings with the CTFA Hairspray Group and at the public workshops. Combined, the 48 companies represented over 90 percent by volume of the California hairspray market in 1990. Sixteen of the companies contacted are either located in California or have a local office/plant in the state and were responsible for about 16 percent by volume of the 1990 California hairspray market. A summary of our discussions with manufacturers is presented below. To maintain the confidentially of the information manufacturers shared with us, we have generalized our discussions and not identified individual manufacturers.

Discussion

Essentially all of the manufacturers contacted have been working diligently to develop 55 percent VOC hairspray formulas that are commercially viable. Several of the manufacturers we contacted are not conducting their own research; rather, they are relying on contract fillers to provide complying product formulations by the standard's effective date. Other manufacturers, generally the larger companies, are developing their own formulas in-house relying on the resin suppliers to supply them with prototype formulas or resins and, in some cases, manufacturers are conducting intensive research with the resin suppliers to develop their own high-water compatible resins. Overall, however, the majority of manufacturers are relying on research by the major resin and propellant suppliers (see discussions on “Raw Material Suppliers Contacts” and “Technical Literature Review”) to develop the necessary raw materials (e.g. resins, propellents) to use in their hairspray formulas and to provide them with prototype formulas that they can then optimize for their own needs.

According to manufacturers, various 55 percent prototype formulations have been provided by the resin suppliers and currently, efforts are focused upon refining these and developing other complying formulations. Several manufacturers, including members of the CTFA Hairspray Group, expressed concerns about current prototype formulations and identified various problems they are encountering when trying to optimize these prototypes into commercially viable products. While the technical literature and reports by the raw material suppliers could lead one to the conclusion that the 55 percent VOC standard is already

commercially feasible, manufacturers disagree for reasons we present here and elsewhere in this report. While there is general consensus that the 55 percent standard is technologically feasible, manufacturers report that the prototype formulas offered are clearly not commercially viable products and need additional refinement and consumer testing before they could successfully market the product. Manufacturers have stated that to have a commercially viable product, it must perform at the level expected by their customers. Anything less than this could adversely affect their brand name integrity. Performance problems that they have seen in the prototype formulas that still need to be addressed before marketing include excessive initial curl droop, slow dry times, poor spray characteristics, and loss of high humidity curl resistance. These issues and efforts were discussed at several meetings with ARB staff (Table III-3) and at two public workshops (ARB, 4/30/96; ARB, 10/1/96).

To minimize these performance problems, many manufacturers are continuing to evaluate new resin systems and work to improve the performance characteristics of the prototype formulas. Generally, there are several approaches to developing viable 55 percent VOC aerosols and pumps. The promising approaches are discussed more fully under the section "Technical Literature Review."

According to the manufacturer contacts, the main research efforts appear to be focused on developing satisfactorily performing pump and aerosol hairspray formulations for the household retail market; less research emphasis appears to be placed on developing formulations for the professional salon market. This is not altogether surprising, since various high performance aerosol formulations using HFC-152a to some degree have been published for several years. Because of the high profit margins in professional salon products, most manufacturers contacted expressed little concern that complying formulations for the salon market can be developed and successfully brought to commercial market, even with the higher cost of HFC-152a. On the other hand, the higher cost of HFC-152a (currently at $1.85/pound vs. $0.25/pound for n-butane and $0.40/pound for DME) is expected to drive more research into high water, DME-based formulations for the low-end to mid-range retail products. Some companies want to develop "single juice" formulations for both aerosols and pumps to keep their costs down while others want to develop distinct formulations for aerosols and pumps to optimize the different attributes of their product lines. For all companies, they want to ensure that the reformulation of their current product lines will be "transparent" enough to retain their current customer base; otherwise, they fear losing market share.

Many manufacturers, including those in the CTFA Hairspray Group, have stated that additional time beyond January 1, 1998, is needed to complete their efforts to have commercially-acceptable hairspray products. When the CTFA Hairspray Group approached the ARB staff in October 1995, they requested postponement of the 55 percent VOC standard until January 1, 2002; however, they recently indicated they would accept a compliance date of July 1, 2000. This additional time is needed to fully evaluate formulas using HFC-152a, optimize prototype formulas, complete consumer and safety testing, implement any necessary plant modifications, and final production runs. One of the more promising approaches for formulating a 55 percent

hairspray is to use HFC-152a to replace all or part of the VOC propellent. According to manufacturers, this approach was not considered seriously until the fall of 1995 due to the fact that until then, manufacturers were not assured of the availability of this non-VOC propellent. The additional time will provide the necessary time to complete the development and successfully bring to commercial market aerosol hairsprays using HFC-152a.

Other manufacturers expressed confidence in either their ability to develop complying formulations or the ability of the resin suppliers to develop fully water-compatible, high performing resin systems. One manufacturer, IQ Holdings, Incorporated (IQ Holdings), expressed open optimism and confidence to have a technologically and commercially feasible 55 percent VOC aerosol and pump hairspray in the market by January 1, 1998 (ARB, 4/30/96; ARB 10/1/96). According to IQ Holdings, they have the technology to produce 55 percent VOC products that perform as well or better than 80 percent VOC products and has offered to license their technology to other companies so they may develop their own complying products.

In addition to IQ Holdings, three companies representing a very small percentage of the current national hairspray sales stated that they have been selling 55 percent or alcohol-free, zero percent VOC hairspray products for several years. According to these companies, there are customers in various market segments that have accepted their complying products.

Raw Material Suppliers Contacts:

From discussions with one propellant, two actuator, and six resin suppliers, it appears the 55 percent VOC hairspray standard is technologically feasible. Those raw material suppliers involved in the pump and aerosol reformulation process agree that the development of efficacious 55 percent VOC products will be the result of a combined effort between product manufacturers, resin manufacturers, propellant suppliers (aerosol only), and actuator suppliers. Many resin suppliers have already developed working relationships with other types of suppliers and have developed 55 percent VOC prototype formulations that they believe will be successful in the market place once the prototype formula is optimized by a manufacturer. A summary of our discussions with the raw material suppliers is provided below.

Discussion

<u>Amerchol</u>

Amerchol, a company owned by Union Carbide, manufactures resins. They are considered a relatively new supplier of hairspray resins since they were not in the hairspray market prior to the adoption of the consumer products regulation. However, even though they are a new supplier to the hairspray market, they believe they have a unique resin which can be used successfully in 55 percent VOC hairsprays.

Amerchol's resin is latex-based and is prepared through an emulsion polymerization process. This results in a resin that is dispersed in the aqueous phase and overcomes many of the problems encountered when formulating aqueous hairsprays with traditional resins that were developed to perform in anhydrous systems. According to Amerchol, some suppliers have modified traditional resins by adding a neutralizer to improve compatibility with aqueous systems. However, in Amerchol's opinion, this decreases the performance of the resin in a hairspray. According to Amerchol, their resin is based on a different technology which can tolerate large amounts of water, improve the drying characteristics of hairsprays formulated with the resin, and have good film forming abilities. This technology also improves the spray characteristics and performance. When atomized, dispersion resins form uniform, micron-size droplets. Since the resin is not dissolved in the solvent, the resin will not bind the water to the hair even in formulations with high percentages of water. The resin increases the overall surface area which allows the water to evaporate faster.

Amerchol has developed low-VOC hairspray prototype formulas in both pump and aerosol forms. For pumps, Amerchol has developed a zero percent VOC prototype formulation and indicate that other pump formulations can be adapted for any amount of water. However, the optimum formulation contains 55 percent ethanol. For aerosols, Amerchol has prototype formulations which contain as little as 10-15 percent VOC with the optimum formulation being a 55 percent VOC system that uses 40 percent DME propellant and 15 percent ethanol. Amerchol prefers to use DME in the aerosol formulations since it avoids a two-phase system that can result when using hydrocarbon propellants.

According to Amerchol, their prototype formulations have good physical characteristics because the viscosity remains low and is not affected by high solid concentrations. The formulations also have good freeze/thaw stability due to the inclusion of a carefully selected copolymer molecular weight and surfactant in the formulation. In addition, Amerchol has worked closely with valve suppliers to optimize the packaging system to reduce the problems with clogging and to optimize the spray characteristics of the product.

Overall, Amerchol claims that the performance characteristics of their aerosol and pump prototype formulations have excellent curl retention and quick dry time[1]. In addition, they believe the combability, feel, shine, tackiness and flaking resistance are equivalent to an 80 percent VOC product. The initial curl droop tests conducted by Amerchol to evaluate their 55 percent VOC prototype formulations with 80 percent market leader formulations indicated that their prototype formulations were within acceptable limits. Curl retention, a key characteristic, was also evaluated in an environment at 90 percent humidity. The curl retention test was performed to check the ability of the prototype formulations to hold the hairstyle throughout the day in extreme conditions. In these tests, Amerchol's 55 percent VOC aerosol and pump prototypes were equivalent in performance to the 80 percent VOC market leaders.

[1] While a common complaint of 55 percent VOC hairsprays is a longer dry time, Amerchol claims that consumers could not determine a difference in dry time between their 55 percent VOC product and an 80 percent VOC formula.

Amerchol has been actively marketing their products and has targeted their promotion efforts to multi-national product manufacturers and mid-size companies. Amerchol has also worked to improve the hairspray industry's knowledge about their resins and technologies by publishing articles and placing advertisements in both the Drug and Cosmetic Industries and Spray Technology & Marketing magazines.

BASF, National Starch and Chemical Company, and International Specialty Products

BASF, National Starch and Chemical Company (National Starch) and International Specialty Products (ISP) are resin suppliers who have been selling hairspray resins to product manufacturers for many years prior to the development of the consumer products regulation. The resins produced by these companies were originally designed for use in anhydrous systems and, to remain in solution, need to be used with neutralizers. By modifying their anhydrous resins and/or developing new resins, these companies hope that their new products can be used to produce efficacious 55 percent VOC hairsprays.

BASF, National Starch, and ISP collaborated to present an overall view of their efforts at the October 19, 1995, CTFA meeting with the ARB staff. They believe that there are two reformulation options which can be used in developing 55 percent VOC aerosol hairsprays. The options are: (1) using HFC-152a as a propellant in an anhydrous system, or (2) using DME propellant in conjunction with a water-based concentrate. Their resins, originally designed for use in ethanol-based systems, perform well in HFC-152a systems, however, they believe that this option will be too expensive. While they do have patents or pending patents for 55 percent VOC resin formulations using DME/water, according to these suppliers, their patents do not adequately address industry's efficacy concerns.

They believe that DME/water formulations still have resin stability/compatibility, viscosity/surface tension, can/valve stability, and dry time concerns because of the increased use of water in them. According to BASF, National Starch, and ISP, drying time and initial curl droop are the biggest concerns because increasing the amount of water increases formula viscosity and surface tension. The DME/water formulations also evaporate slower than current product formulations, weigh the hair down, and break the hydrogen bonds necessary for holding a temporary hairstyle. One example was presented by Mr. Joseph A. Dallal of ISP at the October 19, 1995, CTFA meeting with ARB staff. Mr. Dallal demonstrated the difference between the tack measurements and dry time of both an 80 percent VOC and a 55 percent VOC formulation (data collected instrumentally).

Measurement	80% VOC	55% VOC
Dry time	7.83 minutes	10 minutes
Tack measurements above -2.0 Force [G]	4.5 minutes	3.0 minutes
Strongest measurement at (Force[G])	-12.0	-4.2

BASF, National Starch, and ISP believe that the additional water in the formulation impedes film formation and softens the hairspray resin and hair. This results in less curl retention (hold), less stiffness, and more initial curl droop, thereby decreasing the efficacy of the formulation. According to these companies, the viscosity and surface tension, parameters which are crucial in developing suitable spray characteristics, are also affected by the increase in water. By replacing ethanol with water, both the viscosity and surface tension increase which clogs the valve, increases the spray particle size, and produces a less effective spray pattern. The can/valve stability is decreased as well with corrosion being its main obstacle.

At the October 19, 1995 meeting, the three resin suppliers stated that the research breakthrough that will counteract the negative effects of water still eludes them and must be achieved in order for them to help hairspray manufacturers achieve the 55 percent VOC goal. According to these suppliers, addressing a negative effect which they attribute to the high water content in their prototype formulations results in other negative effects. These companies believe the key to developing efficacious 55 percent VOC formulations is to develop new resins with lower molecular weights or address the conformation issues with the higher molecular weight resins.

Subsequent to the October 1995 meeting, National Starch announced they have developed a new resin, Balance™ 0/55, which they believe meets some of the specifications discussed with ARB staff in October. National Starch created this resin using an emulsion-based technology with the following physical properties and characteristics: low hydrodynamic volume, low viscosity, medium molecular weight and very good film formation. Although this resin is new to the industry National Starch believes it will aid manufacturers in creating efficacious 55 percent product formulations.

BASF and ISP are also focusing their resin research efforts to develop resins with the aforementioned specifications. However, all three companies agree that the resin development must be integrated with new propellants, valves, and cans to result in an efficacious 55 percent VOC hairspray. They continue to do research in resin and formulation development, and are looking into formulations with propellant combinations which they hope will produce affordable and efficacious 55 percent VOC products in the near future.

DuPont

DuPont indicated that they believe the 55 percent VOC hairspray standard is both technically and economically feasible for aerosols. DuPont manufactures two types of propellant that can be used in hairspray, HFC-152a and DME. While several companies produce DME, DuPont is currently the major U.S. supplier of HFC-152a. HFC-152a is a negligibly photochemically reactive VOC and is exempt from the consumer products regulation. It plays an important role in hairspray reformulation because it can replace the hydrocarbon propellants in current formulations allowing the product to meet the 55 percent VOC standard. While DME

is a VOC, its use is beneficial in high water content formulations because of its excellent water solubility and relatively low cost.

According to DuPont, the acceptability of the cost of hairsprays appear to be related to price sensitivity of the consumer and the type of product being sold. The cost of hairspray play a larger role in the drug, grocery, and mass merchandiser stores than in the professional salon market. Professional salon products, prior to the adoption of the consumer products regulation, cost the consumer between $8.00 to $18.00 a can, in comparison to the lower cost hairspray products that cost under $2.00 a can in the mass retail market. Before the 80 percent VOC hairspray standard became effective in 1993, many salon products which had hydrocarbon propellant in them were reformulated with HFC-152a propellant to comply with the standard. Current salon products range from $12.00 to $20.00, though the increase in cost to the consumer may not have been driven exclusively by the formulation change.

DuPont has indicated they believe that hairspray manufacturers that produce professional salon products may once again rely solely on the use of HFC-152a to comply with the 55 percent VOC standard. DuPont recognizes that the use of HFC-152a alone may not be an economically viable option for hairspray products selling under $2.00. However, to address this issue, DuPont is developing formulations which uses propellant combinations that should adequately address the lower cost products. DuPont realizes that the reluctance to use HFC-152a is related to the cost of the propellant and that minimizing its use requires more research, development, and testing than those products that solely use HFC-152a.

As a supplier to the hairspray industry, DuPont has kept abreast of manufacturers efforts to develop low-VOC hairspray formulations. Some of the concerns that have been raised by the industry and heard by DuPont include the following:

- the 55 percent VOC standard is not feasible by 1998;
- the cost of HFC-152a is too high; and
- the DME/water systems do not perform well due to the presence of large amounts of water.

Over the past few years, DuPont has worked to improve the technology available to produce low-VOC hairspray by developing prototype 55 percent VOC formulations that use HFC-152a solely as a propellant or combinations of HFC-152a, DME, and hydrocarbon propellants. DuPont has organized a technical research group that develops low-VOC hairspray formulations and works with the industry to address their concerns. The goal of this work is to develop HFC-152a minimized formulations using possible propellant combinations of hydrocarbon propellant A17 and HFC-152a, DME and HFC-152a, or A17, HFC-152a, and DME. In addition to optimizing the propellant combination, DuPont is working on a variety of resins from four resin suppliers (BASF, National Starch, ISP, and Rohm and Haas) to develop a range of low-VOC formulations and address efficacy shortfalls. Other current and future outreach efforts by DuPont include publishing articles in trade journals that address the use of HFC-152a in

low-VOC hairspray reformulations and offering classes to industry personnel that explain propellant options for developing low-VOC formulations.

While the refined formulations minimize the use of HFC-152a, DuPont has indicated that they are sensitive to the concerns raised by industry regarding the cost of HFC-152a. According to DuPont, the expected increase of competition in the market, the start-up of DuPont's new HFC-152a manufacturing facility in Corpus Christi, Texas, and the propellant mixtures that can be used in 55 percent VOC formulas, will all likely lead to the use of HFC-152a as being a more viable and cost-effective option for manufacturers as they develop 55 percent VOC hairspray formulations. Although last year DuPont was the only HFC-152a manufacturer in the United States, two other companies are planning to manufacture HFC-152a. DuPont has stated that they spent $50 million to expand their HFC-152a capacity and develop a new lower cost manufacturing process upon which a second plant has been built. According to DuPont, the new plant, built primarily for the 55 percent VOC standard, will allow DuPont to competitively price their HFC-152a product against the new suppliers, since they expect the cost of HFC-152a to decrease. As recently as November 1996, DuPont decreased the cost of their HFC-152a product from $1.95/pound to $1.85/pound. Nonetheless, the cost of manufacturing HFC-152a will likely continue to be higher than the cost of manufacturing hydrocarbon propellants.

DuPont has also indicated that hairspray manufacturers will not likely incur any additional can or filling costs when reformulating with HFC-152a. The overall pressure of the hairspray can is within the limits of the currently used 2N, 2P and 2Q cans because the addition of ethanol lowers the pressure of HFC-152a. Therefore, no additional can or filling costs are expected. In addition, cost increases are not expected at many of the filling facilities since they have made manufacturing changes to accommodate using HFC-152a to comply with the first-tier 80 percent VOC hairspray standard.

Another cost concern that has been raised by industry is the historically limited supply of HFC-152a. While this was a valid concern when the first-tier hairspray standard became effective in 1993, DuPont claims that this is no longer an issue. Although DuPont published articles in April and July of 1995 announcing their plans to increase HFC-152a production, DuPont did not publicly announce their new HFC-152a facility until September of 1995 and hairspray manufacturers indicate that they were not completely assured of the adequate supply of HFC-152a until late 1995. DuPont expects their new HFC-152a manufacturing plant in Texas to be operational by December 1996, with full production capacity reached within a year. If needed, this plant could increase its capacity by an additional 40 percent and this site has room for yet another facility as well. DuPont believes industry's supply concerns would be more than adequately addressed by the two DuPont manufacturing facilities and any competing suppliers.

Eastman Chemical Company

Eastman Chemical Company (Eastman) manufactures a number of resins for a variety of end-use applications. Four resins from the "Eastman AQ" water dispersible polyester family are useful for developing in low-VOC hairspray formulations. The most recent addition to this family, "Eastman AQ 48 Ultra," was designed specifically for 55 percent VOC applications.

According to Eastman, the characteristics that make these resins useful for low-VOC hairspray formulations include low molecular weight, small dispersion particle size, low solution viscosity, and the ability to be adapted to hydrophilic or hydrophobic systems. Because these resins contain dispersion polymers, they offer a distinct advantage over the solution polymers typically used in hairspray formulations. The primary advantage of dispersion polymers is in the significantly smaller particle size. This translates to a smaller aerosol droplet size which in turn produces faster dry times due to the smaller amount of solvent. The smaller particle size also produces clear formulations. Dispersion polymers also offer low viscosity which allows manufacturers to increase the resin or solid concentration in finished formulations. Another unique feature claimed is the adaptability of Eastman's resin for either a hydrophilic or a hydrophobic system which allows hairspray manufacturers to develop a variety of formulations that range from totally water-based zero percent VOC to 55 percent VOC formulations.

Eastman has developed a range of formulations that include zero percent VOC and 55 percent VOC pump products, and 55 percent VOC aerosol products (using DME as the propellant). In addition, Eastman has worked with valve manufacturers to optimize the spray characteristics and evaluate the spray properties of their systems. One customer has already made a national product launch of a zero percent VOC pump formulation which uses one of Eastman's resins. Eastman continues to work with customers to develop additional resins for 55 percent VOC formulations to complement their current product offering. As with their previous development efforts, Eastman focuses on designing resins with the performance attributes required by their customers. These include initial curl droop, curl retention, dry time, viscosity, and aesthetic properties. It is Eastman's intention to have a family of resins to offer their customers a range of formulation options for 55 percent VOC products. Eastman has promoted these materials at various trade meetings and in assorted trade publications. Their past marketing effort include a display poster at a CTFA show and at the "In-Cosmetics" trade show in Paris. Eastman also plans to publish additional articles and give presentations that promote the use of their resins.

Precision Valve

Precision Valve (Precision) manufactures actuators and delivery systems for both pumps and aerosols for a variety of different industries including the hairspray industry. To assist hairspray manufacturers and resin suppliers in developing efficacious 55 percent VOC hairspray, Precision works with prototype and refined formulations to optimize the delivery system to

provide the best spray characteristics. Precision will also provide sample valve systems to hairspray manufacturers for testing in their own labs.

Rohm and Haas

Rohm and Haas is a resin supplier that is relatively new to the hairspray market. According to Rohm and Haas, they have developed a resin that can be used to produce efficacious 55 percent VOC hairspray formulations. They believe their resin is one of the best resins in the market for formulating 55 percent VOC hairspray and their patent, which was submitted approximately one year ago, is pending approval. Rohm and Haas also believes that because of the consumer products regulation, the hairspray resin supplying business and the technologies developed by those companies in the market have changed significantly. According to Rohm and Haas, the three new companies, Amerchol, Eastman Chemical, and Rohm and Haas, are now competing with the established market leaders, National Starch (a subsidiary of Unilever) and ISP. All three new resin suppliers are large (Fortune 300) polymer producers that have significant resin/polymer offerings and expertise in other film-forming applications/markets, and that have been shifting to lower VOCs outside the personal care/hairspray area. These three new suppliers have brought new technology, including the dispersion-type products, to the hairspray market. Rohm and Haas also believes that without the low-VOC (55 percent) target, it is doubtful that any of the three new suppliers would have entered the hairspray market at this time.

Rohm and Haas has at least five pump and aerosol prototype formulations which are starting points for their customers. They claim that the laboratory performance tests, with respect to hold, curl retention, and tack, of these 55 percent VOC formulations are equivalent to the 80 percent VOC products that were randomly selected from the shelf. The dry time of their 55 percent VOC formulations were observed to be only several seconds longer than the "off-the-shelf" 80 percent VOC products. Rohm and Haas stated that the only parameter that is noticeably different when comparing their 55 percent VOC and other 80 percent VOC formulations is the initial curl droop. The initial curl droop for the 55 percent and 80 percent VOC formulations were about 9-12 percent and 6 percent, respectively. This would equate to a loss of 1.5 to 2.0 centimeters (cm) for the 55 percent VOC products and 1 cm for the 80 percent VOC products, based on a 23 cm hair strand curled to a length of 6 cm.

Rohm and Haas, like most resin suppliers, does not have a salon to test their products, therefore, their prototype formulation evaluations are based on laboratory tests. Their customers must refine the formulations and perform the salon and consumer evaluations. However, Rohm and Haas has been told by most of their customers that their resin is in the top two to three candidates for formulating 55 percent VOC hairspray. One hairspray manufacturer told Rohm and Haas that the 55 percent VOC formulation Rohm and Haas developed was better than their own current 80 percent formulation. This hairspray manufacturer uses a combination of two resins, one of which was developed by Rohm and Haas. In addition, Rohm and Haas believes that several large companies are fairly close to developing 55 percent VOC hairspray.

Seaquist

Seaquist manufactures delivery systems for a variety of industries and has attempted to work with both resin suppliers and hairspray manufacturers to optimize the hairspray delivery system to accommodate changes in formulations. According to Seaquist, their products are currently being used in the hairspray market on a few products which are claimed to contain little or no VOCs.

Seaquist has indicated that of the 30 to 35 formulations provided by approximately three resin suppliers and ten hairspray manufacturers, the primary issues are the degree of atomization and wetness of the spray. Valve clogging is a secondary issue and can be addressed once the primary issues are adequately resolved. Of the formulations submitted to Seaquist, they believe only one had a desirable atomization level. Unfortunately, the product's high surfactant level caused the spray to foam (an undesirable characteristic in hairspray).

Technical Literature Review:

A thorough analysis of available information was performed. This included a review of the trade journals, including Cosmetics and Toiletries Magazine, Spray Technology & Marketing, Drug and Cosmetic Industry, and technical books and information including "Chemical and Physical Behavior of Human Hair," and information from DuPont regarding the Dymel propellants (Robbins, 1994; DuPont Dymel Aerosol Propellants). Additionally, a sales brochure and advertisements posted in the technical journals and other sources are cited, touting various resins' usefulness in formulating 55 percent (and lower) VOC hairspray, and the properties of a presently available zero-percent VOC product. Many technical articles were found in the trade journals which directly address the formulating challenges/issues associated with the upcoming 55 percent VOC standard for hairspray, and discuss solutions achieved to date. An extensive review of the technical literature indicates that, while there are challenges associated with formulating a 55 percent VOC hairspray, manufacturers and raw material suppliers are actively developing solutions to technical problems and with additional time will have commercially viable hairspray products.

Discussion

How do manufacturers and raw materials suppliers propose to decrease the VOC content of hairsprays? There are six general approaches to meeting the 55 percent VOC standard (Russo, 1995; HBA Global Expo, 1994).

Pumps:

1) Replace VOC (generally ethanol) with water.
2) Qualify for an innovative product exemption.

Aerosols:

1) Include water in aerosols by using DME (which is water-miscible) as a propellant.
2) Replace the hydrocarbon propellant with HFC-152a.
3) Use various HFC-152a/DME/hydrocarbon/water combinations.
4) Qualify for an innovative product exemption.

Generally, the technical articles begin by outlining the challenges associated with the 55 percent VOC standard. To summarize, many of the currently used polymers work well in products containing little or no water, and that is how hairsprays were generally formulated before VOC content was an issue (Schill *et al.*, 1995; Price, 1995). The simplest and least expensive way to decrease VOCs from these traditional anhydrous hairsprays, which contain between 91 and 97 percent VOCs, is to replace either the ethanol or the propellant with water. However, unless appropriate steps are taken to address the limitations of the traditional formulations, inclusion of water in previously anhydrous systems will have some negative packaging and performance impacts (Price, 1995). Issues that can be associated with directly replacing solvents with water include the potential for solvent/propellant incompatibility, possible can corrosion, chemical breakdown of the resin, increased dry time and initial curl droop, reduced humidity resistance, and a tacky feel during the drying process. Additional water can also cause increased viscosity and surface tension, resulting in sprays that are coarser and wetter, which further aggravates the dry time and initial curl droop problems mentioned previously. Following is a summary of the technical literature detailing the steps hairspray manufacturers and raw material suppliers have taken to address these issues.

Option - Incorporate water into the formulation:

Resin manufacturers have developed resins that address many of the issues described above, in regard to increasing the water concentration in pump products. One example is the "Acudyne ™ 255" polymer developed by Rohm and Haas (Schill *et al.*, 1995). It is described as follows: "Its key feature was its effectiveness in pump and aerosol hairsprays containing as low as 55 percent volatile organic compound (VOC)." This resin is soluble in solutions containing up to 65 percent water, and is chemically stable in these solutions. After neutralization, its tensile strength, film flexibility and hygroscopic properties resulted in "excellent high humidity curl retention." Also, "the polymer did not form any strong associations with water, leading to quick dry times and low if any tack on the hair." In regard to specific performance properties, curl retention of a 55 percent VOC pump product formulated with this resin compared favorably to a commercial 80 percent VOC pump hairspray. The drying time profile of the 55 percent pump product was very similar to that of the 80 percent pump. Here, dry time is characterized in three stages: the "wet" stage, the "tacky" stage, and the "dry" stage. Both were dry in under 50 seconds. The 55 percent product was dry in about 48 seconds, whereas the 80 percent pump was dry in about 43 seconds. In the 55 percent product, the wet phase was about one second longer and the tacky phase was about three seconds longer. Curl droop was slightly greater than that of the 80 percent pump, with percent curl retention in the 55 percent product being about 88 percent and in the 80 percent pump being about 90 percent. The anhydrous product retained

about 95 percent of the curl. In order to obtain curl retention nearly equivalent to that of the 80 percent pump, it was necessary to use a seven percent concentration of polymer, rather than a five percent resin concentration used in the 80 percent VOC product. In summary, Rohm and Haas believes that the Acudyne 255 polymer performed well in a 55 percent formulation and addresses many of the critical performance issues associated with low-VOC products (Schill *et al.*, 1995).

Rohm and Haas notes, of the Acudyne 255 polymer discussed previously, that "We found that 55 percent VOC aerosol formulations could also be easily prepared using the propellants DME, HFC-152a, or a combination of both (Schill *et al.*, 1995)." Therefore, it can be used in the pump formulations described above, or as aerosol formulations in both anhydrous and hydrous solutions.

A new resin based on aqueous dispersion technology has been developed by Amerchol Corporation (Pavlichko, 1995; Amerchol Corporation Product Information Sheet, 1995). This resin, described as an aqueous dispersion resin (ADR) in the technical article and Amerhold DR-25 in the product advertisement, "...affords the research chemist the flexibility to develop highly functional hairspray systems that also meet future VOC guidelines (Pavlichko, 1995)." Many of the resins currently available interact very strongly with water in solution (Schill, et al., 1995). Therefore, the viscosity of these polymers can become very high when dissolved in solutions containing 40 to 70 percent water (Hinz, 1995). This aqueous dispersion technology allows the small, solid resin polymer particles to be suspended in water without settling out. These particles are coated with surfactants, which act to stabilize the emulsion by preventing the resin particles from agglomerating. This results in a low viscosity aqueous phase, which allows higher polymer concentrations and resins with higher molecular weights to be used. This resin can be used in aerosol and pump hairsprays. Studies show that the performance of this resin when formulated into a 55 percent VOC pump (seven percent resin and 55 percent ethanol), is superior in regard to curl retention under very humid conditions (90 percent relative humidity), when compared to two 80 percent VOC pump products that are currently available, one in the retail market and one in the salon market. Even under this extreme condition it shows approximately a 90 percent curl retention after one hour in this new resin, whereas the other two products showed between 80 and 85 percent curl retention. A second study (Amerchol Corporation Product Information Sheet) showed that "a 55% VOC system containing 6% Amerhold DR-25 offers superior curl retention even when compared to an 80% VOC solution polymer system." Curl retention after one hour for the 55 percent product was 92 percent, and at 4 hours was 83 percent, while the one and four hour curl retention for the 80 percent products were 82 percent and 77 percent, respectively.

The Amerchol resin was also salon performance tested in a 55 percent VOC pump form (with small amounts of additional resins added to optimize the system to a more "finished" product) against an 80 percent ethanol retail pump product using a "half-head" method. Cosmeticians graded the two products for drying time (including tack), stiffness, curl retention, and rinsability. In regard to dry time, performance was equivalent, with both well within acceptable drying times for pumps, with the 80 percent product having a "slight advantage." The

cosmeticians actually preferred the test product because of lower perceived tack during and after drying. The two products could not be differentiated in regard to stiffness and rinsability. The test product was judged to be superior in regard to curl retention. Amerchol summarizes the results by saying that this resin "yield[s] stiff, flexible films that contribute to excellent high-humidity curl retention in both aerosol and non-aerosol hairspray formulations..." and "As a result of this new acrylates copolymer technology, hairspray systems can now be formulated to meet consumer desires while addressing the proposed regulations regarding VOC levels (Pavlichko, 1995)."

The Amerchol resin can also be used to formulate aerosol hairsprays. This resin can be incorporated into DME/water-containing aerosol hairspray, as Amerchol's initial work shows the resin to "be completely compatible with DME." In aerosol as well as non-aerosol systems, this resin results in excellent high-humidity curl retention.

National Starch also has a Lovocryl-47 resin which is specifically designed for low-VOC formulas (Russo, 1995). Here it is indicated that this resin, in a product with high solids and DME as propellant, is a viable approach to formulating a high solids 55 percent VOC aerosol. In this product, "the effects of the water are mitigated and the style of the hair is retained." In a study comparing the initial curl droop of an aerosol high solids 55 percent hairspray with a 95 percent VOC anhydrous product, the high solids 55 percent product performed well, with the percent curl retention in the initial curl droop test of about 86 percent, compared to a percent curl retention in the initial curl droop test of about 90 percent with the anhydrous, high-VOC product. The hairspray designed as an innovative product at 55 percent VOC actually outperformed all the above, with percent curl retention in the initial curl droop test of approximately 92 percent. However, another approach presented by National Starch involves the formulation of a two-phase water-based aerosol hairspray including DME at concentrations that exceed its solubility in water. This is done because "higher levels of propellant in an aerosol spray will lead to better break-up of the concentrate and a drier spray." The benefits, in addition to that just noted, include a lower concentrate viscosity, which will result in better atomization, a better spray pattern, and quicker drying. It is also noted that the spray dries in a clear film. The product described in the article actually has a VOC content of 45 percent. They note that "...formulation of VOC systems 55% or less, as well as alcohol-free claims, are feasible with this technique. The system is versatile since a variety of resins, solids levels, and propellant levels can be used. Additional surfactants can be added to further stabilize the emulsion." Russo summarizes by noting that "formulating with a high solids, propellant 152a or a two phase alcohol-free system offer different avenues for the formulator."

National Starch's Dr. Jack Guth notes that the performance of an 80 percent VOC aerosol can match the performance of an anhydrous system if new resins are used, and at 55 percent VOC, performance can approach anhydrous (HBA Global Expo, 1994). However, equivalent performance for the 55 percent product does require significant research and development. For example, using an existing resin, he notes that dry time for an anhydrous product is about 5.3 seconds, while the 80 percent product had a dry time of 9.5 seconds, and the 55 percent product

had a dry time of 13.2 seconds. However, he does indicate that polymer modification and changes in resin concentration can ameliorate the negative effects. For example, by modifying the resin to reduce polymer viscosity, spray aesthetics can be improved, and by increasing the hydrophobicity of the resin, drying time is reduced, as is initial curl droop, and humidity resistance is increased. Initial curl droop is also dependent upon the type and amount of resin used. Increasing polymer concentration can ameliorate initial curl droop. For example, an anhydrous product shows about 93 percent curl retention in the initial curl droop test (which is matched by a high solids 80 percent product); however, the high solids 55 percent product shows about a 90 percent curl retention in the initial curl droop test. Humidity resistance of the 55 percent product matches that of an anhydrous aerosol in this study. Again, a higher resin concentration (six percent rather than four percent), is required to obtain equivalent results (HBA Global Expo, 1994).

National Starch also advertises their AMPHOMER LV-71 polymer which they suggest for use in low-VOC hairsprays. Included are several low-VOC formulas including an alcohol-free styling mist and an alcohol-free aerosol hairspray (National Starch, "AMPHOMER LV-71").

Eastman Chemical Company AQ polymers are advertised to speed up apparent dry time, have excellent resistance to humid conditions, allow production of formulations down to zero percent VOC in pump or aerosol (Eastman Chemical Company Advertisement, 1994). These polymers are further discussed in the "Raw Material Suppliers Contacts" summary.

BASF has introduced a hair fixative resin, Luvimer 36D, which is an aqueous resin dispersion that is recommended for haircare formulators developing water-based hairspray. This resin offers long-lasting curl retention and holding strength as well as being cost-effective. In addition, a lower molecular weight version of Luvimer 36D is available for use in 55 percent VOC formulations in pump or aerosol (BASF Product Advertisement, "Making Waves," 1996; BASF Product Advertisement, "Luvimer 36D - A new wave in water-based dispersions, 1996).

A search of the technical literature also reveals some formulas that include some of the previously discussed resins and can be used to produce 55 percent VOC hairsprays. The article in *Spray Technology and Marketing* includes formulas from National Starch, Amerchol Corp., Rohm and Haas, BASF, and Eastman Chemical (Spray Technology and Marketing, 1996; Cosmetics and Toiletries Magazine, 1996)

DuPont also notes that "One of the characteristic weak points of a water-based spray is initial droop, seen a few moments after the style has been sprayed. Often the curl retention will be identical to, if not better than, an anhydrous formulation but the first few performance measurements are very poor. For this reason, a key data point in the studies has been a 10-minute curl retention reading (Boulden, 1992)."

Option - Replace hydrocarbon propellants with HFC-152a:

DuPont has tested a 55 percent VOC aerosol hairspray (containing 55 percent alcohol and 35 percent HFC-152a) for curl retention, and shown it to be either equivalent or superior to commercial anhydrous sprays in regard to percent curl retention at ten minutes using a protocol from ISP. The vapor pressure was found to be well within the acceptable range for aerosol hairsprays.

As noted previously, National Starch also has a Lovocryl-47 resin which is specifically designed for low-VOC formulas (Russo, 1995). They indicate that this resin can also be formulated to allow the incorporation of HFC-152a, resulting in an anhydrous product. Benefits of formulating an anhydrous spray such as this include "quick drying time, ideal flow properties for bonding of the hair, elimination of can stability problems due to water, and little initial curl droop."

The Rohm and Haas Acudyne 255 polymer resin could also be easily formulated into an aerosol product containing HFC-152a alone, or an HFC-152a/DME combination (Schill *et al.*, 1995).

Option - Use various HFC-152a/DME/hydrocarbon/water combinations:

By using various combinations of DME/HFC-152a/water, it is possible to adjust the hairspray to meet performance and cost specifications. For example, "by adjusting the HFC-152a/DME ratio, the water content, pressure and cost can be adjusted. In fact, it is possible to formulate a product containing from zero to 41 percent water using this strategy (Strobach, 1993). There are several published formularies for aerosol products with HFC-152a concentrations of less than 10 percent, substantially decreasing the cost of reformulation. DuPont has tested these formularies for curl retention, which is a critical performance parameter, and found that these products perform as well as the "traditional" anhydrous aerosol hairspray (Boulden, 1992). For example, one formulation (29% water, 20.4% DME, and 9.6% HFC-152a) showed 10 minute curl retention of 89 percent, compared to two commercial anhydrous products with curl retentions of 88 percent and 93 percent. The one hour curl retention was 75 percent for the 55 percent VOC hairspray, with 71 percent and 79 percent for the two commercial anhydrous products (Boulden, 1992). DuPont is also investigating the use of HFC-152a/DME/hydrocarbon formulations which include only a small amount of water (DuPont, 1/24/96). This is a fairly new development, so there aren't any formularies yet available. However, this should give manufacturers even more options when formulating aerosol 55 percent VOC hairspray.

DuPont notes that an approach involving the blending of HFC-152a, DME, and hydrocarbons may be the best strategy, along with variations in resin concentration and delivery rate (HBA Global Expo, 1994). "By utilizing all three strategies, an acceptable product that could meet the future limits should be attainable (DuPont, 3/14/96)." Additionally, DME/HFC-152a/hydrocarbon blends are already available from Aeropres Corporation, Diversified CPC International, and Technical Propellants (HBA Global Expo, 1994).

Option - Qualify for an innovative product exemption:

According to Dr. Jack Guth of National Starch and Mr. John Leuszler of DuPont, it is possible to implement a strategy using a higher solids concentration, coupled with a lower delivery rate, to formulate an innovative product which matches the performance of the anhydrous product, yet results in less emissions per use (HBA Global Expo, 1994).

Anhydrous innovative 55 percent VOC aerosols can be formulated that are equivalent to traditional high-VOC anhydrous systems according to National Starch (HBA Global Expo, 1994). National Starch compared various products, including an anhydrous high-VOC aerosol product with an "innovative" 55 percent VOC aerosol product. This innovative 55 percent product uses a DME/hydrocarbon-propelled high solids formulary which contains only eight percent water. They found that the innovative product actually performed better than the 95 percent anhydrous product in terms of percent curl retention (Russo, 1995).

Resins for Low-VOC Hairspray Products:

There are numerous resins available for formulating low-VOC hairspray. Several have been described previously, but following is a short summary (Price, 1995; BASF Product Advertisement, "Making Waves," 1996; BASF Product Advertisement, "Luvimer 36D - a new wave in water-based dispersions," 1996):

Trade Name*	**Supplier**
Ultrahold-8, **Luvimer 36D, Luvimer Low VOC**	**BASF**
Amerhold DR-25	**Amerchol**
Acudyne 255	**Rohm and Haas**
Diahold	Sandoz
Eastman AQ Polymer	**Eastman Chemical**
Diaformer	Sandoz
Amphomer, Lovocryl-47	**National Starch and Chemical**
Resyn 28-2930	National Starch and Chemical
Advantage CP	ISP
Gaffix VC-713	ISP

* Those resins and suppliers shown in bold are discussed in the technical review.

Other components that can be modified to aid in the formulation of low-VOC hairspray:

There are now valves available which help obtain uniform fine sprays over a much wider range of product viscosity, solids concentration and solution surface tension. Additionally, other pressurizing alternatives to hydrocarbon propellants exist. Examples include the "Exxel Atmos System" by Exxel Container, the "Eurospray" bottle by Inter Airspray AB, the "Advanced Barrier System" by Advanced Monobloc, and "Pepcap" by Belgium Spray (Price, 1995).

Corrosion Issues:

Water/DME combinations can be corrosive to tinplate and aluminum aerosol containers. The use of corrosion inhibitors may therefore be required, along with extensive storage tests (Strobach, 1993). Water/HFC-152a combinations can also result in can corrosion. However, most value-brand hairsprays contain water to meet the current 80 percent VOC standard. Therefore, many manufacturers are familiar with corrosion control technology and currently use a corrosion inhibitor to control can corrosion (DuPont, 10/18/96). In order to offer technical support to their HFC-152a customers, DuPont has conducted laboratory studies to aid in screening the effectiveness of various corrosion control strategies (DuPont, 10/18/96; Boulden, 1993). Strategies for inhibiting corrosion in water-based products, and specific corrosion inhibitors effective for 55 percent VOC hairsprays, have been identified. These include adjusting the pH, minimizing chlorides, other halides, sulfates and oxygen in the can, and the use of a properly selected corrosion inhibitor or combination of corrosion inhibitors (Rocafort, 1995).

Patent Review:

There were 19 patent references found that were assigned in 1992 or beyond. These patents are listed in Table III-4. Of the 19 patents, five apply to aerosol compositions, two apply to pump compositions, and twelve apply to both aerosol and pump compositions. The Amerchol Corporation, American Telecast Corporation, and Clairol, Incorporated each hold one patent, Chesebrough Pond's USA Company, Eastman Kodak Company, Helene Curtis, Incorporated, and National Starch and Chemical Investment Holding Corporation each hold two patents, and ISP Investments, Incorporated holds the remaining eight patents. The Amerchol Corporation, American Telecast Corporation, Eastman Kodak Company, ISP Investments, Incorporated, and National Starch and Chemical Investment Holding Corporation are raw material suppliers whereas Chesebrough Pond's USA Company, Clairol, Incorporated, and Helene Curtis, Incorporated are hairspray manufacturers.

The patents contain information for developing a range of hairspray compositions, including 55 percent VOC sample compositions that are claimed to be successful in meeting one or more of the following performance characteristics: curl retention, dry time, feel, flaking, brittleness, humidity resistance, luster, gloss, particle size, rinsability, spray pattern, spray rate, tack, and viscosity. The low-VOC compositions claimed in the patents basically consist of a fixative polymer, solvent (primarily water and/or some alcohol), propellant in aerosols (primarily DME), and adjuvants.

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Air Resources Board, letters to ARB staff, circa 1995 through 1997.

Air Resources Board, patents reviewed by ARB staff and listed in Table III-4, 1992 through 1996.

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IV.

HAIRSPRAY REFORMULATION TIMELINES

A. INTRODUCTION

As discussed in the previous chapter, the raw material suppliers and manufacturers have been working to develop low-VOC hairsprays. These efforts have resulted in several reformulation approaches that manufacturers can follow when developing their hairspray formulas. Our findings revealed, however, that manufacturers need to conduct additional research and development to refine and test prototype formulas and this cannot be completed by the January 1, 1998, compliance date. To determine the extension of time required we worked with industry representatives to understand the reformulation process. As part of this effort, we requested manufacturers supply us with their actual research and development timelines that they are following to develop commercially viable 55 percent VOC hairspray products. A discussion of our findings based on the reformulation timelines and other information that forms the basis for our recommendation is presented in this chapter.

B. REFORMULATION TIMELINES

At the October 1996 public workshop to discuss our hairspray technical assessment, we requested timelines that estimate individual manufacturers' efforts to develop hairspray products that meet the 55 percent VOC standard. In response to our request, eight manufacturers submitted a total of 27 timelines. Collectively, these manufacturers represent about 80 percent of the California hairspray market. Among the responding companies were small, medium and large-sized manufacturers, as well as one contract filler/private labeler. Because of the wide variety of companies represented, we assumed that our analysis of the submitted timelines would yield results which are representative of the entire hairspray manufacturing industry.

Although the timelines vary in length, they have similar paths that may be broken into several generalized steps. These steps apply to both aerosol and pump formulation development. It is important to note that these steps are not necessarily cumulative or sequential; some aspects of each general step may overlap.

The first step, *formula development* (12-48 months), encompasses the research and initial assessment of formulations utilizing specific resins, solvents, additives, fragrances, valves and packaging. The next step, *prototype tests* (9-36 months), typically includes efficacy, corrosion and stability studies of promising formulations to identify those that will make viable products. A *consumer/safety evaluation* (9-24 months) is also common, involving market research and toxicity studies of final formulas. After the final formula(s) is chosen, *plant modifications* (6-9 months) are frequently necessary, entailing hardware changes in the production process for the reformulated product. Lastly, *final product development* (9-34 months) occurs and typically includes final stability testing, raw material/parts procurement, regulatory registration, product

labeling, refinement of the production process, and test production runs of the reformulated product.

C. BASIS FOR POSTPONEMENT OF THE HAIRSPRAY STANDARD UNTIL JUNE 1, 1999

To determine the appropriate time extension for the 55 percent standard, we evaluated the timelines we received, held several discussions with manufacturers, and looked at the current hairspray market. Our goal was to find a date by which time we could be assured the basic market demand for hairsprays could be satisfied. A 17-month extension, until June 1, 1999, fulfills this goal and is based on the following points:

- The 55 percent VOC standard is technologically feasible. The discussion in the previous chapter of the work and progress being made in formulation technology supports this finding. This is also supported by the general consensus in the industry that the 55 percent VOC standard is technologically feasible. The steps in the submitted timelines, therefore, represent manufacturers' efforts to refine compliant technologies and prototypes into commercially-viable products.

- Roughly half of the timelines project compliance around mid-1999 (see Table IV-1). Collectively, products that manufacturers have told us will meet the standard by mid-1999 represent over 30 percent of the market sales (by volume) for aerosol and pump hairsprays.

- We believe there is opportunity to streamline the steps in the remaining timelines which currently show commercial feasibility after June 1, 1999 through accelerated research including additional research and development (R&D) expenditure, technology transfers from sister companies with more advanced technologies, and concurrent implementation of some steps that are currently sequential. Some of the steps in these timelines appear to include large safety margins based on very conservative, worst-case assumptions. In addition, we believe there are opportunities to conduct more prototype testing concurrently with the formulation development steps. Moreover, as companies begin to market 55 percent VOC products around 1999, we believe the intense competitive forces in this market will result in companies accelerating their R&D efforts to compete with brand-name, complying products in the market. Accounting for the companies we believe can accelerate their reformulation efforts, we believe the basic market demand for hairsprays will be met.

- Based on our review of the timelines, we have compiled an example timeline that we anticipate most manufacturers could reasonably follow in order to complete development of commercially viable 55 percent products by June 1999 (see Figure IV-1). The example covers a 3½ year period and assumes manufacturers began

research on 55 percent products by early 1996.

- One company, IQ Holdings, is planning to license out its low-VOC technologies to hairspray manufacturers at prices which it states are affordable. Also, a raw material supplier (Du Pont) has invested significant resources into increasing the availability of the non-VOC propellant, HFC-152a. Compliant formulations based on these private sector activities will provide additional options for manufacturers with less R&D resources to develop viable products that comply by mid-1999.

TABLE IV-1.
HAIRSPRAY TIMELINES SUBMITTED BY MANUFACTURERS

Compliance dates for **aerosol** timelines (in chronological order)	Compliance dates for **pump** timelines (in chronological order)
1st quarter 1998	***1st quarter 1998***
3rd quarter 1998	***3rd quarter 1998***
4th quarter 1998	***4th quarter 1998***
4th quarter 1998	***4th quarter 1998***
4th quarter 1998	***4th quarter 1998***
2nd quarter 1999	***2nd quarter 1999***
2nd quarter 1999	1st quarter 2000
3rd quarter 1999	2nd quarter 2000
4th quarter 1999	4th quarter 2000
1st quarter 2000	4th quarter 2000
4th quarter 2000	1st quarter 2002
2nd quarter 2001	3rd quarter 2002
1st quarter 2002	
1st quarter 2002	
1st quarter 2003	
Note: Timelines that project compliance by June 1, 1999 are shown in ***bold italics***.	

FIGURE IV-1.
TYPICAL REFORMULATION TIMELINE NECESSARY
TO MEET 55 PERCENT HAIRSPRAY STANDARD

(AVAILABLE ON REQUEST)

V.

ENVIRONMENTAL, ECONOMIC, AND SIP IMPACTS

A. INTRODUCTION

This chapter consists of our environmental impacts analysis regarding the proposed amendment postponing the effective date for the hairspray standard from January 1, 1998 to June 1, 1999 and the economic impacts analysis for all of the proposed amendments to the consumer products regulation.

Legal Requirements Applicable to the Environmental and Economic Impacts Analyses:

Both the California Environmental Quality Act (CEQA) and Board policy require the ARB to consider the potential adverse environmental impacts of proposed regulations. Because the ARB's program involving the adoption of regulations has been certified by the Secretary of Resources (see Public Resources Codes section 21080.5), CEQA allows the ARB's environmental analysis to be included in the ARB Technical Support Document (TSD) in lieu of preparing an environmental impact report or negative declaration. In addition, the ARB will respond in writing to all significant environmental points raised by the public during the public review period or at the Board hearing. These responses will be contained in the Final Statement of Reasons for the modifications to these regulations.

Two bills passed by the California Legislature in 1993 require regulators to evaluate the effect of regulations on jobs, business, and the ability to compete in the national marketplace. These bills are: (1) Senate Bill 513 - Job losses and gains; Business creations and elimination, and; (2) Assembly Bill 969 - Business competitiveness. Senate Bill 513 requires state agencies to assess the potential impact of their regulations on California jobs and on business expansion, elimination, or creation.

Assembly Bill 969 requires a state agency to include the ability of California business to compete with business in other states in its adverse economic impact assessment. The requirements of these bills, as well as other economic analysis requirements, are codified in Government Code sections 11346.3 and 11346.5.

B. ENVIRONMENTAL AND ECONOMIC IMPACTS OF AMENDMENTS TO THE CONSUMER PRODUCTS REGULATION

1. Environmental Impacts Analysis

Summary and Findings:

The primary environmental impact of postponing the 55 percent VOC standard for hairsprays from January 1, 1998 to June 1, 1999 is that fewer VOC emission reductions will be obtained during that 17-month period (i.e., approximately 14 tons/day statewide emission reductions will be delayed). None of the remaining proposed modifications, including those proposed amendments to require compliance plans from those manufacturers that exceed the 55 percent VOC standard between January 1, 1998 and June 1, 1999 and the modification to the variance provision requiring mitigation of excess emissions for any variance granted after June 1, 1999 for hairspray products, have any reasonably foreseeable adverse environmental impacts.

Overriding Considerations for the Proposed Amendments to the Consumer Products Regulation

In the previous discussion, we identified one negative environmental impact that would occur as a result of these amendments: that of fewer VOC emission reductions obtained during the period of postponement of the 55 percent hairspray standard. However, the intent in postponing this standard is to preserve the commercial feasibility of the standard and ensure that basic market demand can be met. Without additional time, many manufacturers would experience adverse economic impacts and disruption of the hairspray market. This amendment will help ensure that manufacturers will be able to develop consumer accepted products to meet the basic market demand. Postponement of the standard will allow additional time for manufacturers to improve the emerging technologies that are required for low-VOC hairsprays and develop commercially viable products. Therefore, additional emission reductions beyond those originally predicted may be realized. We believe that these considerations override any adverse impacts that may occur in the near-term as a result of these amendments.

2. Economic Impacts Analysis

Introduction

In this section, we discuss the economic impacts that would be expected from the implementation of the two-tier hairspray standards, with emphasis on impacts from the second-tier (55 percent) VOC standard. The overall impacts are summarized, followed by a more detailed discussion of specific aspects of the economic impacts:

(1) the analysis of potential impacts to California businesses, employment, business status, and competitiveness as required by the California Administrative Procedure Act (APA);
(2) an analysis of potential impacts to California State or local agencies;
(3) an analysis of the cost-effectiveness of the hairspray standards in comparison with the cost-effectiveness of other ARB regulations; and
(4) an analysis of the impacts to raw material costs, as an indicator of potential price changes due to the regulation.

It is important to note that we conducted the economic impacts analysis shown in this report to meet recently-enacted legal requirements under the APA. As such, this analysis represents an update to and expansion of the cost-effectiveness analysis we previously conducted of the hairspray standards, along with the standards for other consumer product categories, during the original Phase I consumer products rulemaking process (ARB, 1990a; ARB, 1990b; ARB, 1990c). In that rulemaking, our analysis showed that the standards for hairsprays and other regulated categories were cost-effective in comparison with other regulated sources of air pollution.

Summary of Economic Impacts Analysis

Overall, the staff expects most manufacturers or marketers of hairspray products to benefit from the proposed amendments because of the greater amount of time those companies will have to meet the 55 percent VOC standard. We also expect no significant adverse impacts from the proposed compliance plan requirements since similar marketing plans are a normal part of the manufacturers' standard business practices. On the other hand, our proposed variance mitigation requirements may result in significant economic impacts, depending on the magnitude of the excess emissions that would be mitigated and the length of time required to mitigate these emissions. Because we do not know which manufacturers will apply for a variance, it is not possible to predict the actual impacts the variance proposal may have. It should be noted, however, that the proposed variance amendment includes a provision that allows the Executive Officer to waive all or part of the mitigation requirement based on consideration of an extraordinary economic hardship or other good causes.

Some raw material suppliers and at least one manufacturer may be adversely impacted by the proposed amendments because they may not realize the return on their investment that they had planned. Most of these manufacturers are located outside of California. Thus, we do not expect their loss of profit to cause a significant change in California employment, business status, and business competitiveness. In addition, since no State agency currently manufactures or markets hairspray products, we do not expect any economic impacts on State agencies due to the staff's proposed amendments.

Our analysis shows that the cost-effectiveness of the hairspray standards compares favorably with the cost-effectiveness of the Phase I-II consumer product regulation and other

ARB regulations. We calculate an incremental cost-effectiveness (current 80 percent VOC to 55 percent VOC) ranging from $0.50 to $3.80 per pound of VOC reduced, with an average of $2.25 per pound of VOC reduced. The average incremental cost-effectiveness compares favorably with the $1.70 per pound of VOC reduced previously reported as the overall cost-effectiveness for the Phase I-II consumer products regulation.

Our analysis also indicates that raw material changes for complying with the second-tier standard (relative to current 80 percent or pre-regulatory costs) can result in a cost savings of about $0.10 per unit to a cost increase of about $0.35 per unit for low-cost products (about $0.45 per unit increase for medium-high cost premium products). The analysis assumed the present cost for raw materials; the raw material costs were calculated for 55 percent VOC products meeting the current compliance date of January 1, 1998. The staff's proposed amendment will provide additional time for meeting the 55 percent VOC limit, during which the raw material costs are most likely to fall. To the extent that the projected cost savings or increases are ultimately passed on to the consumer, the actual retail price of 55 percent VOC-compliant products may be higher or lower than indicated in this analysis.

Economic Impacts Analysis on California Businesses (APA Requirement)

Legal Requirements

Prior to January 1, 1994, the California Administrative Procedure Act (APA; Government Code section 11340 *et seq*.) required state agencies to assess the potential for adverse economic and cost impacts of proposed regulations on California businesses. In 1993, the California Legislature enacted SB 513 (Stats. 1993, Chapter 1063) and AB 969 (Stats. 1993, Chapter 1038), which became legally effective on January 1, 1994. These bills amended the APA to incorporate additional economic analysis requirements to the ones that already existed.

AB 969 requires state agencies, in assessing a proposed regulation's potential for an adverse economic impact on businesses, to consider whether the proposed action may also have an adverse economic impact on the ability of California businesses to compete with businesses in other states. As part of this evaluation state agencies must consider, but shall not be limited to, information supplied by interested parties. SB 513 requires state agencies proposing to adopt a regulation to consider whether and to what extent it will affect:

(1) the creation or elimination of jobs within California,
(2) the creation of new businesses or the elimination of existing businesses within California, and
(3) the expansion of businesses currently doing business within California.

Findings

Businesses Affected

Any business which manufactures, fills, distributes, and/or retails hairspray products subject to the requirements of the California consumer products regulation can potentially be affected by the proposed modifications. A manufacturer or marketer is a firm that formulates, develops and markets products for sale to consumers. A filler is a firm that mixes, pressurizes, fills, and packages products for marketers. A distributor or wholesaler is a firm that distributes products to retail outlets. A retailer is a firm that sales products to consumers for final use. A retailer could be a food and drug store, a mass merchandiser or a salon.

Also, businesses which supply raw materials and equipment to hairspray marketers or fillers can potentially be affected by the proposed modifications. According to the ARB Consumer Product Registration Database, there are 78 manufacturers and fillers of hairspray products in the U.S., producing and marketing a wide selection of hairspray products including 266 aerosol and 362 pump products. Thirty-three of these manufacturers, mostly medium- or small-sized firms, are located in California. These manufacturers control about 17 percent of the California market as shown in Table V-1.

TABLE V-1.
MARKET SHARE FOR HAIRSPRAY PRODUCTS IN CALIFORNIA

Product Type	Non-California Firms	California Firms
Aerosol	51%	8%
Pump	32%	9%

Source: ARB 1990 Consumer Products Registration Database

The hairspray industry reported $595 million in national sales in 1995, of which California accounted for about $70 million. The bulk of this sales, however, was generated by a few manufacturers. Table V-2 provides a list of the major companies in the hairspray industry.

TABLE V-2.
MAJOR COMPANIES IN THE HAIRSPRAY INDUSTRY

Company	Market Share in Dollar Term
Chesebrough-Pond's (Unilever)	21.9%
Helene Curtis (Unilever)	18.4
Gillette	11.1
Procter and Gamble	9.0
Alberto Culver	7.9
Redmond	6.0
Clairol	4.7
All Others	21.0

Source: Spray Technology & Marketing, 6.11:28-30, November 1996

Potential Impacts on Business

Most manufacturers or marketers would potentially benefit from the proposed amendments. However, at least one manufacturer and a number of raw material suppliers may be adversely affected. The proposed amendments were developed in response to concerns raised by hairspray manufacturers and fillers that the industry will not be able to achieve the second tier VOC standard of 55 percent for hairspray products by January 1, 1998. The industry has made great efforts to develop complying formulations and in fact has overcome many obstacles in the reformulation of hairspray products. However we found that manufacturers need additional time to produce commercially viable hairspray products. The proposed amendments would provide hairspray manufacturers with additional time to continue their efforts in developing compliant products or improving the performance of compliant products already developed. This extension would relieve manufacturers from abandoning the market as a whole. The extension would also be beneficial to California consumers because their choice of hairspray products would not be restricted.

The proposed amendments, however, may adversely affect at least one manufacturer who has stated that it will be ready to sell 55 percent VOC aerosol and pump products by January 1, 1998. This manufacturer is willing to license its technology to those manufacturers who are unable to meet the 55 percent VOC standard by the 1998 deadline. A simple extension of the 55 percent VOC standard would reduce the ability of this manufacturer to be rewarded for its efforts and realize any income from its potential licensing agreements. However, we anticipate that this impact will be mitigated by the proposed early reduction credit program and the variance provision, as discussed earlier in this report.

The proposed early reduction credit program should have no adverse economic impacts on manufacturers since it would reward those manufacturers who are able to comply early. Moreover, the proposed compliance plan requirements should have no significant adverse economic impacts on manufacturers since developing similar market plans is a standard part of most companies' normal business practices. On the other hand, our proposed variance mitigation requirements may result in significant economic impacts, depending on the magnitude of the excess emissions that would be mitigated and the length of time required to mitigate these emissions. Because we do not know which manufacturers will apply for a variance, it is not possible to predict the actual impacts the variance proposal may have. It should be noted, however, that the proposed variance amendment includes a provision that allows the Executive Officer to waive all or part of the mitigation requirement based on consideration of an extraordinary economic hardship or other good causes.

The extension may also have adverse economic impacts on some raw material suppliers that have already invested substantial sums of capital to commercially produce raw materials needed for the production of compliant products. These suppliers would not be able to realize the return on their invested capital as soon as they may have planned. Furthermore, the suppliers may have to charge lower prices for their products because the extension would allow new competitors to enter the market, thereby reducing their profit margin. One supplier has indicated that the extension would result in idling a recently completed plant, consequently leading to a substantial revenue loss. The proposed amendment, however, would benefit some manufacturers which supply raw materials for existing hairspray products because they will be able to sell their products for a longer period of time.

Potential Impact on Consumer Prices

The proposed extension would postpone any potential increase in the retail price of hairspray products that might have resulted from the implementation of the 55 percent VOC standard. The extension would also reduce the magnitude of the future retail price increases. This is because manufacturers would have a greater amount of time to develop a more cost-effective product and because the market for raw materials may become competitive as more suppliers enter the market.

Industry representatives have stated their belief that 55 percent VOC hairspray products will be more expensive to produce than the existing 80 percent VOC products. The cost increase will be more evident in the "value-brand" segment of the market. This segment of the market consists of a limited selection of products with the lowest retail prices, normally around $1.00 per can. According to the industry, the production cost for value-brands would increase from 10 to over 100 percent if the 55 percent VOC standard becomes effective as scheduled. Our analysis indicates that the change in raw material costs for a value-brand product could range between a decrease of $0.10 per unit to an increase of about $0.35 per unit. Consumers in this segment of the market are usually very sensitive to any price changes. That will, in turn, limit the ability of manufacturers to pass on their cost increases to consumers. To the extent that the projected cost

savings or increases are passed on to the consumer, the actual retail price of 55 percent VOC-compliant value-brand products may be higher or lower than indicated in this analysis.

On the other hand, the "premium-brand" segment of the market is less sensitive to price changes. This segment of the market consists of a wide selection of products with varying prices ranging from about $2.00 to $18.00 can. The competition in this segment of the market relies more on non-price factors such as market niche, brand loyalty and environmental friendliness. Non-price factors would allow a firm to establish a captive market where consumers prefer its particular brand over competing brands. In a captive market, manufacturers have greater control over their product prices because of consumers' willingness to pay premium prices for their products. Thus, manufacturers are usually able to pass on a large portion of the cost increases to consumers. Our analysis indicates that the change in raw material costs for a premium-brand product could range between a decrease of $0.10 per unit to an increase of about $0.45 per unit. To the extent that the projected cost savings or increases are passed on to the consumer, the actual retail price of 55 percent VOC-compliant premium-brand products may be higher or lower than indicated in this analysis.

While they are less sensitive to price changes, consumers in the premium-brand segment of the market are more sensitive to changes in product attributes. A lowering of performance attributes will be damaging to the product sale. The staff's proposed amendments will provide additional time for manufacturers to refine and enhance the performance of their 55 percent VOC-compliant prototypes and develop new ones. We therefore believe that, under the proposed amendments, the transition to 55 percent VOC products will be more transparent to the premium-brand consumers, with minimized impacts to this segment of the market due to changes in product attributes.

Potential Impact on Product Quality

The proposed amendments would provide manufacturers and fillers of hairspray products with additional time to overcome barriers in producing commercially acceptable products. An extensive evaluation of the formulation technology indicates that a 55 percent VOC aerosol using HFC-152a could perform as well as the existing hairspray aerosol products.

The proposed amendments also allow the industry to overcome challenges associated with formulating a pump hairspray. The formulation of a 55 percent VOC pump hairspray product has proven to be more challenging than a similar aerosol product. However, at least one company has already indicated that it has successfully developed and perfected commercially acceptable aerosol and pump hairspray products for the market by January 1, 1998.

Potential Impact on Brand Equity

As part of their marketing efforts, businesses spent millions of dollars over years to create a strong identity for their products. Brand identity helps businesses attract loyal customers. A brand name normally applies to a host of products. An established brand usually is very valuable in the market place. This value is referred to as brand equity. Businesses are protective of their brand equity. They continuously monitor consumers to make sure that their brands have distinct identities and are associated with quality products.

In our discussion with the industry, some businesses have stated that their brand equities would be adversely affected if the 55 percent VOC standard is implemented as scheduled. They claim their brand equity would be impacted because they would be unable to develop cost-effective hairspray products that are satisfactory to consumers. The introduction of lower quality hairsprays would not only damage the sale of their hairspray products, but also would reduce the sale of other products sold under the same brand name. The reduced sale of products would, in turn, lower the value of their brand equities. The proposed amendment would mitigate these impacts to brand equities by allowing more time for these businesses to develop products which meet their expectations as well as their customers' expectations.

Potential Impact on Business Competitiveness

The proposed amendments would have no significant impact on the ability of California businesses to compete with businesses in other states. These amendments would provide relief to all businesses that manufacture or market hairspray products regardless of their location. Businesses that may be adversely affected by the amendments are located outside California.

Potential Impact on Employment

The proposed amendments are not expected to cause a noticeable change in California employment. Although there are no employment figures available for the hairspray industry, California employment in the toilet preparation industry which includes the hairspray industry was less than 8,000 in 1993 according to the U.S. Department of Commerce. These employees, working in 153 establishments across the state, generated about $233 million in payroll. This represents about 0.4 percent of total California manufacturing jobs and payroll in 1993.

The amendment may actually result in the creation of some jobs as businesses allocate resources to reformulate their products. To the extent that these resources are spent in California, some California jobs may be created. The amendment may also save some California jobs because some manufacturers which supply raw materials for existing hairspray products will continue to supply the market as the California market would not be abandoned by businesses that would not have been able to produce compliant products by January 1, 1998.

Potential Impact on Business Creation, Elimination, or Expansion

The proposed amendments would have no noticeable impact on the status of California businesses. However, some raw material manufacturers which have invested substantial sums of capital to produce raw materials for compliant products may be adversely affected because the proposed extension would delay the realization of return on their investment. These manufacturers, as stated earlier, are located outside California.

The proposed amendments may prevent some marginal businesses which supply raw materials for existing hairspray products from going out of business. Some business opportunities may also be created for raw material suppliers and consultants as hairspray manufacturers continue their efforts in formulating low-VOC hairspray products.

Analysis of Economic Impacts on State and Local Agencies

According to the ARB Consumer Products Registration Database, there are no State or local agencies, including the California Prison Industry Authority, that manufacture or market hairspray products which are subject to the staff's proposed amendments. We have therefore determined that the proposed amendments will not create costs or savings, as defined in Government Code section 11346.5(a)(6), to any State agency or in federal funding to the State, costs or mandate to any local agency or school district whether or not reimbursable by the State pursuant to Part 7 (commencing with section 17500), Division 4, Title 2 of the Government Code, or other nondiscretionary savings to local agencies.

Cost-Effectiveness Analysis

Introduction

In the following analysis, we evaluated the anticipated cost-effectiveness of the second-tier, 55 percent VOC limit for hairsprays. Since manufacturers are currently subject to the first-tier standard (80 percent VOC limit), we will refer to the cost-effectiveness for manufacturers reformulating from 80 percent VOC to 55 percent VOC as the "incremental cost-effectiveness." Evaluating the cost-effectiveness of different regulations allows us to compare the relative efficiency of those regulations in reducing the same pound of a pollutant. Hence, we report in this section the incremental cost-effectiveness in terms of "dollars (to be) spent per pound of VOC reduced." For perspective, we will compare the estimated incremental cost-effectiveness to both the overall cost-effectiveness for the two-tier hairspray standards (going from unregulated to 80 percent to 55 percent) and the cost-effectiveness of other ARB regulations.

Methodology

The cost-effectiveness of a standard is generally defined as the ratio of total dollars to be spent to comply with the standard (as an annualized cost) to the mass reduction of the pollutant(s) to be achieved by complying with that standard (in annual pounds). Annual costs include annualized non-recurring fixed costs (e.g., total research and development (R&D), product and

consumer testing, equipment purchases/modifications, etc.) and annual recurring costs (e.g., raw materials, labeling, packaging, etc.). In this analysis, we annualized the non-recurring fixed costs using the Capital Recovery Method, in which the total fixed costs are multiplied by the Capital Recovery Factor (CRF) to convert these costs into equal annual installment payments over the amortization period. The general equation for calculating the incremental cost-effectiveness is presented below:

$$\text{Incremental Cost-Effectiveness} = \frac{\textbf{(Annualized Fixed Costs)}_{55\%\ VOC}^{80\%\ VOC} + \textbf{(Annual Recurring Costs)}_{55\%\ VOC}^{80\%\ VOC}}{\textbf{(Annual Mass Reduction in VOC)}_{55\%\ VOC}^{80\%\ VOC}}$$

where:

$$\text{Annualized Fixed Costs} = \textbf{(Fixed Costs) x } \frac{\mathbf{i\,(1\ +\ i)^n}}{\mathbf{(1\ +\ i)^n\ -\ 1}}$$

$i(1+i)^n/((1+i)^n-1)$ = Capital Recovery Factor (CRF)
i = interest rate, %
n = number of years in amortization period

In this analysis, we calculated the incremental cost-effectiveness using assumed amortization periods of 10 to 20 years. These are commonly-used periods for determining appropriate installment payments for paying off debts in the chemical processing industry. We also assumed a fixed interest rate of 10 percent throughout the assumed amortization periods. These assumptions are conservative and constitute standard practice in cost-effectiveness analyses of air pollution regulations. With these assumptions, the CRFs are 0.1627 and 0.1175 for 10 and 20 year amortization periods, respectively.

A review of relevant technical literature and industry trade journals provided little information that could be used to estimate costs. We therefore requested industry representatives to provide their best estimates of the non-recurring costs (e.g., research and development (R&D), capital expenditures, testing, etc.) and the recurring costs (e.g., materials costs) for meeting the standard. We requested this information at both the April and October 1996 workshops. Detailed cost data were obtained from three companies: a small-medium sized manufacturer, a large manufacturer, and a contract filler/private labeler. In the "Results" section, we refer to these companies as Companies A, B, and C (the relative order of the companies is scrambled to preserve confidentiality).

Based on the relative market positions of these companies and the wide variety of products represented (retail, professional salons, value/mid/premium brands), we believe the cost data these companies submitted are the best available data and can reasonably be assumed to be representative of the industry as a whole. With this assumption, we projected the total non-recurring costs to the entire industry by dividing the total non-recurring costs submitted by each company with its reported market share to project to 100 percent. Using this method, we

estimate the total non-recurring costs for the industry to meet the 55 percent VOC limit (from the current 80 percent VOC level) ranges from about $20 million to $50 million. The range reflects the relative efficiency of the R&D efforts undertaken by the companies that submitted cost data.

In estimating total recurring costs, we assumed the only significant impact would result from changes in the cost of the propellant and liquid concentrate; no significant changes to packaging or labeling are anticipated (Lim, 11/25/96). Furthermore, we assumed no significant cost increases for raw materials used in pump spray products, since the production cost of pump products was not raised as a significant issue by industry representatives. Also, we conservatively assumed raw material costs for the propellant and liquid concentrate in hairsprays would increase by 10 to 100 percent for "value-brands" (products with retail prices around $1.00 per unit) and 20 to 100 percent for "premium brands" (all other products)[*]. This assumption is based on projections by industry representatives (ARB, 10/1/96). The raw material costs for existing 80 percent VOC aerosol products range from about $0.55 to $0.75 per pound of value-brand and premium-brand, respectively.

Results

Table V-3 shows the results of our cost-effectiveness analysis. The analysis shows that the non-recurring fixed costs (i.e., R&D) have a relatively small impact on the incremental cost-effectiveness; the major influence is the raw material costs. As stated previously, we assumed current raw material costs in this analysis. Therefore, these results are conservative and the cost-effectiveness values are expected to decrease (i.e., be more cost-effective) under the staff's proposed delay for the 55 percent VOC standard. Table V-4 shows that, on average, the estimated incremental cost-effectiveness of the second-tier hairspray standard compares favorably with the cost-effectiveness of both the Phase I-II consumer products regulation and other ARB consumer product regulations. At an average of about $2.25 per pound of VOC reduced, the incremental cost-effectiveness of reformulating from 80 percent VOC to 55 percent VOC is well within the cost-effectiveness of other ARB regulations and measures.

[*] It should be noted that our own projections of the raw material costs of potential 55 percent VOC-compliant formulations suggest that several feasible formulations are possible which result in little or no increases in raw material costs. In the "Impacts to Raw Material Costs" section, we provide more realistic estimates of the raw material costs for nine 55 percent VOC-compliant formularies published in trade literature, using current costs for the various product ingredients.

TABLE V-3.
PROJECTED HAIRSPRAY 2ND-TIER INCREMENTAL COST-EFFECTIVENESS

Source	Annualized Fixed Costs[1] ($ per Pound of VOC Reduced)		Recurring Costs[2] ($ per Pound of VOC Reduced)		Projected Cost-Effectiveness ($ per Pound of VOC Reduced)		
	Low (1A)	High (1B)	Low (2A)	High (2B)	Low (1A)+(2A)	High (1B)+(2B)	Sales-wtd Average[3]
A	$0.24	$0.33	$0.22	$3.00	$0.46	$3.33	$2.10
B	$0.39	$0.54	$0.22	$3.00	$0.61	$3.54	$2.25
C	$0.59	$0.82	$0.22	$3.00	$0.81	$3.82	$2.50

[1] "Low" calculated at CRF = 0.1175, "High" at CRF = 0.1627

[2] "Low" (value-brand) calculated for $0.55/lb product increasing by 10% and going from 80% VOC to 55% VOC (i.e., [1.1($0.55)-1.0($0.55)]/[0.80-0.55] = $0.22/lb VOC reduced
"High" (premium-brand) calculated for $0.75/lb product increasing by 100% and going from 80% to 55% VOC (i.e., [2.0($0.75)-1.0($0.75)]/[0.80-0.55)] = $3.00/lb VOC reduced

[3] Sales-weighted average calculated with the market share of value brands ("Low") as 44% and market share of premium brands ("High") as 56% (Example: Sales-wtd Avg. $C.E.|_A$ = 0.44*$0.46 + 0.56*$3.33 = $2.10/lb VOC reduced)

TABLE V-4.
COMPARISON OF HAIRSPRAY 2ND-TIER INCREMENTAL COST-EFFECTIVENESS WITH THE COST-EFFECTIVENESS OF OTHER ARB CONSUMER PRODUCT REGULATIONS

Emissions Source	Cost-Effectiveness (Dollars per Pound VOC Reduced)
Hairsprays[1]	$2.25 (avg.)
Aerosol Coating Products[2]	$2.85 to $3.20
Phase II Consumer Products Regulation[3]	<$0.01 to $1.05
Phase I Consumer Products Regulation[4]	net savings to $1.70
Antiperspirants and Deodorants[5]	$0.50 to $1.20
Architectural and Industrial Maintenance Coatings[6]	net savings to $6.40

[1] Reported as sales-wtd average, incremental 2nd-tier cost-effectiveness (80% VOC to 55% VOC); ARB, 1997

[2] ARB, 1995

[3] ARB, 1991

[4] ARB, 1990

[5] ARB, 1989

[6] Suggested Control Measure, developed with the California Air Pollution Control Officers Association; ARB, 1989

Analysis of Impacts to Raw Material Costs

Introduction

In this analysis, we evaluated the anticipated cost impacts from the 55 percent VOC standard on the raw material costs. As stated previously, the raw material costs constitute the major portion of the compliance costs. Evaluating the impacts to raw material costs provides only an indicator of possible impacts to the retail prices of hairsprays (assuming the cost impacts are passed on partially or fully to consumers). Because of unpredictable factors such as the highly

competitive nature of the consumer products market, it is not possible to accurately predict the final retail price of 55 percent VOC hairsprays.

Methodology

As discussed previously, we assumed that any change to the cost of raw materials (propellants, liquid concentrate, etc.) would affect only aerosol hairsprays. To estimate the raw material costs of aerosol hairsprays, we reviewed nine formularies for 55 percent VOC-compliant products as published in a recent issue of a leading industry trade journal (*Spray Technology,* May 1995). We then calculated the per-pound raw material costs of each formulary using the current distributor-level prices for each ingredient. We determined that a reasonable assumption for the range of resin costs (including plasticizers, fragrances, other ingredients) is $3.50 to $7.00 per pound (Rohm & Haas, 7/2/96). This reflects the current range of low- to high-cost resins available to formulators. For perspective, we compared the estimated raw material costs for 55 percent VOC-compliant products with the costs for current 80 percent VOC products and pre-regulatory 94 percent VOC products.

Table V-5 shows the formulary types used in this analysis; Appendix C shows the spreadsheets used to calculate the raw material costs, listing the actual amount (weight percent) and the unit cost (per pound) of each ingredient in the Table V-5 formularies. As shown, we reviewed a variety of formulation technologies that cover the gamut from two-phase, alcohol-free aerosols to high solids formulas to products using various combinations of dimethyl ether and HFC-152a. Also included is an 80 percent VOC formulary (E1 and E2) that is expected by the author of the formulary to meet the 55 percent VOC limit via the Innovative Products provision (IPP). While these formularies may not reflect the exact composition of compliant products that will be marketed, we believe these formularies cover the range of likely formulation approaches for meeting the second-tier standard. As such, we believe these formularies are reasonably representative for the purposes of this cost analysis.

Results

As shown in Table V-5 and Figure V-1, seven of the nine formularies reviewed (Formulas A through G) can be made at costs at or near the current cost level, as depicted by the "reference cost range." The shaded reference cost range represents current cost levels bounded by typical costs for a 94 percent VOC pre-regulatory and current 80 percent VOC products. Most of the product formularies indicate reasonable raw material costs through the use of dimethyl ether.

However, Figure V-1 shows that at least one HFC-152a based formulation (Formula G1/G2) can be made at a cost which is essentially equivalent to current costs. This indicates that the judicious use of HFC-152a, in combination with DME, can result in formulas with little or no adverse impacts to current manufacturing costs. Products using such combinations of HFC-152a and DME may achieve the "best of both worlds," by taking advantage of the fast drying benefits of HFC-152a, along with the cost-minimizing benefits of using DME. This suggests that, even for

the highly price-sensitive value-brand portion of the market, it is possible for formulators to make products which are within the price structure currently seen by consumers.

It should also be noted that marketers are not restricted to selling reduced VOC formulations in order to comply with the standard. As shown in Figure V-1, Formula E1/E2 (80 percent VOC) suggests that manufacturers may be able to reduce emissions (via the Innovative Products provision) while still making products at reasonable cost. This type of formulation may be exempted from meeting the 55 percent standard because of unique packaging/formulation characteristics which result in less VOCs being emitted than from a comparable compliant product.

TABLE V-5.
ANTICIPATED RAW MATERIAL COSTS PER POUND OF PRODUCT

Formulary Type (Number)	Raw Material Costs ($/Lb)		Comments/Reference
	Low (1)	High (2)	
BASELINE FORMULATIONS			
Pre-regulatory 95% VOC Aerosol	$0.55	$0.76	*Spray Tech.*, 2.3:37, March 1992
Current 80% VOC Aerosol	$0.51	$0.72	*Spray Tech.*, 2.6:36, June 1992
55% COMPLIANT FORMULARIES			
Water/DME (A1 /A2)	$0.39	$0.60	*Spray Tech.*, 5.5:42, May 1995 Patent 5,021,238
SD40/DME (B1/B2)	$0.55	$0.88	*Spray Tech.*, 5.5:45, May 1995 Formula 7625:63B
SD40/DME/High Solids (C1/C2)	$0.63	$1.05	*Spray Tech.*, 5.5:40, May 1995 High Solids Formula 1
SD40/DME (D1/D2)	$0.43	$0.64	*Spray Tech.*, 5.5:38, May 1995 Formula 1 (DME w/Accudyne 255)
SD40/DME/A-17/High Solids (E1/E2)	$0.72	$1.13	*Spray Tech.*, 5.5:40, May 1995 Formula 2, 55% VOC Equivalent IPP
SD40/DME (F1/F2)	$0.43	$0.64	*Spray Tech.*, 5.5:45, May 1995 55% Product w/Accudyne 255
SD40/DME/HFC-152a (G1/G2)	$0.58	$0.76	*Spray Tech.*, 5.5:38, May 1995 Formula 2 (cost/HFC-152a minimized)
SD40/HFC-152a (H1/H2)	$1.13	$1.29	*Spray Tech.*, 5.5:41, May 1995 Formulas 3-4, Anhydrous product
SD40/HFC-152a (I1/I2)	$0.96	$1.14	*Spray Tech.*, 5.5:38, May 1995 Formula 3, Low H20 product

Note: "Low" refers to the use of lower cost resin at $3.50/lb; "High" refers to higher cost resins at $7.00/lb

FIGURE V-1.
MATERIAL COSTS COMPARISON

(AVAILABLE ON REQUEST)

Table V-6 shows the results of the raw material costs impact analysis when converted to a per-unit basis. For this calculation, we assumed that the average value-brand contains about 8.5 ounces of product, while the average premium-brand about 12.0 ounces. We also assumed that the average value-brand will use lower cost resin systems at $3.50 per pound, while the premium-brands will use the higher cost resins at $7.00 per pound. As shown in Table V-6, value-brand products based on the nine formularies reviewed can experience a cost savings of about $0.10 per unit up to a cost increase of about $0.35 per unit. Our analysis shows that premium products similar to the nine formularies reviewed can be made at a cost savings of about $0.10 per unit to a cost increase of about $0.45 per unit. These cost impacts are well within the cost savings to approximately 60 cents per unit increase cited as the anticipated per unit cost impacts for the Phase I-II regulation (ARB, 1991a; ARB, 1991b; ARB, 1991c; ARB, 1992).

TABLE V-6.
ANTICIPATED RAW MATERIAL COSTS PER UNIT OF PRODUCT

Formulary Type (Number)	Raw Material Costs ($/Unit)		Comments/Reference
	Value Brands	Premium Brands	
BASELINE FORMULATIONS			
Pre-regulatory 95% VOC Aerosol	$0.29	$0.57	*Spray Tech.*, 2.3:37, March 1992
Current 80% VOC Aerosol	$0.27	$0.54	*Spray Tech.*, 2.6:36, June 1992
55% COMPLIANT FORMULARIES			
Water/DME (A1 /A2)	$0.21	$0.45	*Spray Tech.*, 5.5:42, May 1995 Patent 5,021,238
SD40/DME (B1/B2)	$0.29	$0.66	*Spray Tech.*, 5.5:45, May 1995 Formula 7625:63B
SD40/DME/High Solids (C1/C2)	$0.33	$0.79	*Spray Tech.*, 5.5:40, May 1995 High Solids Formula 1
SD40/DME (D1/D2)	$0.23	$0.48	*Spray Tech.*, 5.5:38, May 1995 Formula 1 (DME w/Accudyne 255)
SD40/DME/A-17/High Solids (E1/E2)	$0.38	$0.85	*Spray Tech.*, 5.5:40, May 1995 Formula 2, 55% VOC Equivalent IPP
SD40/DME (F1/F2)	$0.23	$0.48	*Spray Tech.*, 5.5:45, May 1995 55% Product w/Accudyne 255
SD40/DME/HFC-152a (G1/G2)	$0.31	$0.57	*Spray Tech.*, 5.5:38, May 1995 Formula 2 (cost/HFC-152a minimized)
SD40/HFC-152a (H1/H2)	$0.60	$0.97	*Spray Tech.*, 5.5:41, May 1995 Formulas 3-4, Anhydrous product
SD40/HFC-152a (I1/I2)	$0.51	$0.86	*Spray Tech.*, 5.5:38, May 1995 Formula 3, Low H_2O product

Note: "Low" refers to the use of lower cost resin at $3.50/lb; "High" refers to higher cost resins at $7.00/lb

C. STATE IMPLEMENTATION PLAN IMPACTS

Phase I of the consumer products regulation, including the hairspray standards, was adopted by the Board in October 1990. The hairspray category has two standards. One, an 80 percent VOC standard, became effective on January 1, 1993; the second, a 55 percent VOC standard, will become effective on January 1, 1998. On November 15, 1994, the ARB adopted the State Implementation Plan (SIP) for Ozone. The SIP serves as California's overall long-term plan for the attainment of the federal ambient air quality standards. On August 21, 1995, the

United States Environmental Protection Agency (U.S. EPA) formally approved the consumer products regulations as a SIP revision. This regulation includes both the 1993 and 1998 hairspray standards.

Hairsprays are the largest single emissions category in the consumer product arena, with 46 tons/day VOC emissions estimated for 1990 in the Technical Support Document for the original consumer products rulemaking. To put this value in perspective, the next largest category is automotive windshield washer fluid at 24 tons/day. The third largest category in terms of emissions is insecticides at about 9 tons/day. The majority of the remaining categories are smaller emissions sources, with the majority at about 1.5 tons/day or less.

Because the emissions from hairsprays are so significant, the emission reductions obtained from hairsprays are critical to the success of the consumer products regulation and are a key element of the SIP. However, we have determined that postponement of the 55 percent VOC hairspray standard from January 1, 1998, to June 1, 1999, will not create a shortfall in the emission reductions required in the SIP. This determination is based on the fact that the emission reductions obtained from the implementation of the 55 percent VOC standard were relied upon beginning with the summer ozone season of 1999.

There are many areas in California that are relying on the emission reductions from hairsprays. For example, San Joaquin Valley and San Diego rely on the reductions from the 55 percent VOC standard to demonstrate attainment for the Federal ozone standard in 1999. Other areas used the reductions to meet the rate-of-progress requirements for 1999 and future years. The 1993 standard for hairsprays was estimated to result in approximately 7.2 tons/day reductions in emissions, the second-tier reduction is projected to be approximately 14 tons/day in 1999.

Overall, the hairspray standard achieves approximately a 42 percent reduction in VOC emissions from hairsprays. To put this in perspective with other categories, the insecticides category results in approximately 44 percent reductions from the first-tier and 53 percent when the second-tier standard goes into effect. Therefore, the reductions required from hairspray are not disproportionate to the emissions required from many of the other consumer products categories.

Hairspray Sales Trends

An analysis submitted by the CTFA suggests a decrease since 1990 in California hairspray sales. The CTFA claims that, because of the decrease in sales and resultant emissions, the second-tier (55 percent VOC) standard can be delayed without compromising the emission reductions committed to in the SIP for hairsprays.

At this time, we cannot fully verify CTFA's data. Hairspray sales data from recent years suggest that there probably has been some reduction in emissions due to hairspray sales trends. However, the magnitude of the apparent reduction in sales and emissions, if any, may not be as

large as suggested by the CTFA analysis. This is because the sales data provided by CTFA do not include data for warehouse clubs, salons, beauty supply stores and other outlets.

While the information on hairspray sales trends and emissions is valuable for emissions inventory purposes, we believe, it is not a basis upon which to decide on a time extension. We believe that decisions regarding the level and timing of standards should be based upon technical and commercial feasibility considerations.

We believe that sales/emissions growth data are best used for updating the SIP inventory, and we are appreciative to CTFA for providing this information to us. Once verified and accurately quantified, permanent changes in sales translated into emissions growth trends are useful for adjusting the SIP inventory to reflect the most up-to-date information available. We are continuing to work with CTFA to reach consensus on hairspray sales trends. These data will assist us in updating our emission inventory for this category.

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APPENDIX A:

BOARD RESOLUTION 90-60

(AVAILABLE ON REQUEST)

APPENDIX B:

PROPOSED AMENDMENTS TO THE CONSUMER PRODUCTS REGULATION

REGULATION FOR REDUCING VOLATILE ORGANIC COMPOUND EMISSIONS FROM CONSUMER PRODUCTS

Amend Article 2, Consumer Products, sections 94509, 94513, and 94514, Title 17, California Code of Regulations, to read as follows:

[Note: Proposed amendments to Sections 94509, 94513, and 94514, Title 17, California Code of Regulations, for this rulemaking are shown in **bold/underline** to indicate additions to the text and ~~**bold/strikeout**~~ to indicate deletions. On November 21, 1996 the Board approved amendments to Sections 94509, 94513, and 94514. These amendments have not yet been formally approved by the Office of Administrative Law. The amendments made by the November 1996 rulemaking are identified herein by italics, with deletions shown in italicized strikeouts. These italicized amendments and deletions are not a part of the present proposal.]

SUBCHAPTER 8.5 CONSUMER PRODUCTS

Article 2. Consumer Products

94509. Standards for Consumer Products

(a) Except as provided in Sections 94510, 94511, and 94514, 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.

Table of Standards

Percent Volatile Organic Compounds by Weight

Product Category	**1/1/93**	**1/1/94**	**Future Effective (Date)**
Air Fresheners			
Single Phase Aerosols	70		30 (1/1/96)
Double Phase Aerosols	30		
Liquids/Pump Sprays	18		
Solids/Gels	3		
Dual Purpose Air Freshener/ Disinfectant Aerosols		60	
Automotive Windshield Washer Fluids:			
Type A Areas*	35		
All Other Areas	10		
Bathroom and Tile Cleaners			
Aerosols		7	
All Other Forms		5	
Engine Degreasers	75		50 (1/1/96)

* Type A Areas include only the following: Del Norte, Shasta and Trinity Counties; the Great Basin Valley, Lake Tahoe, Mountain Counties, and Northeast Plateau Air Basins, as defined in Title 17, California Code of Regulations, Sections 60105, 60108, 60111, and 60113.

Table of Standards
(continued)

Percent Volatile Organic Compounds by Weight

Product Category	**1/1/93**	**1/1/94**	**Future Effective (Date)**
Floor Polishes/Waxes			
Products for Flexible Flooring Materials		7	
Products for Nonresilient Flooring		10	
Wood Floor Wax		90	
Furniture Maintenance Products			
Aerosols		25	
All Other Forms Except Solid or Paste Forms		7	
General Purpose Cleaners		10	
Glass Cleaners			
Aerosols	12		
All Other Forms	8		6 (1/1/96)
Hairsprays	80		55 ~~(1/1/98)~~**(6/1/99)**
Hair Mousses		16	
Hair Styling Gels		6	
Insect Repellents			
Aerosols		65	
Laundry Prewash			
Aerosols/Solids		22	
All Other Forms		5	
Nail Polish Removers	85	75	(1/1/96)

Table of Standards
(continued)

Percent Volatile Organic Compounds by Weight

Product Category	**1/1/93**	**1/1/94**	**Future Effective (Date)**
Oven Cleaners			
Aerosols/Pump Sprays	8		
Liquids	5		
Shaving Creams		5	

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Table of Standards
(Phase II)

Percent Volatile Organic Compounds by Weight

Product Category	**1/1/95**	**Future Effective (Date)**
Adhesives		
Aerosol [*See 94509(i)*]	*75*	*25 (1/1/2002)**
Contact	*80*	
Construction and Panel	*40*	
General Purpose	*10*	
Aerosol Cooking Sprays	18	
Automotive Brake Cleaners		50 (1/1/97)
Charcoal Lighter Material	See 94509(h)	
Carburetor-Choke Cleaners	75	

* *The Board will hold a public hearing by June 1, 2000, to review and consider any appropriate modifications to the 25 percent VOC standard for aerosol adhesives.*

Table of Standards
(Phase II - continued)

Percent Volatile Organic Compounds by Weight

Product Category	**1/1/95**	**Future Effective (Date)**
Dusting Aids		
Aerosol	35	25 (1/1/97)
All Other Forms	7	
Fabric Protectants	75	60 (1/1/97)
~~*Household Adhesives*~~		
~~*Aerosol*~~	~~*75*~~	~~*25 (1/1/97)*~~
~~*Contact*~~	~~*80*~~	
~~*Construction and Panel*~~	~~*40*~~	
~~*General Purpose*~~	~~*10*~~	
Insecticides		
Crawling Bug	40	20 (1/1/98)
Flea and Tick	25	
Flying Bug	35	
Foggers	45	
Lawn and Garden	20	
Laundry Starch Products	5	
Personal Fragrance Products		
Products with 20% or less fragrance	80	75 (1/1/99)
Products with more than 20% fragrance	70	65 (1/1/99)

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(b) *Products that are diluted prior to use*

(1) For consumer products for which the label, packaging, or accompanying literature specifically states that the product should be diluted *with water or non-VOC solvent* prior to use, the limits specified in subsection (a) shall apply to the product only after the minimum recommended dilution has taken place. For purposes of this subsection (b), "minimum recommended dilution" shall not include recommendations for incidental use of a concentrated product to deal with limited special applications such as hard-to-remove soils or stains.

(2) For consumer products for which the label, packaging, or accompanying literature states that the product should be diluted with any VOC solvent prior to use, the limits specified in subsection (a) shall apply to the product only after the maximum recommended dilution has taken place.

(c) *Sell-through of products.* Notwithstanding the provisions of Section 94509(a), a consumer product manufactured prior to each of the effective dates specified for that product in the Table of Standards may be sold, supplied, or offered for sale for up to *three years* ~~*eighteen months*~~ after each of the specified effective dates. ~~*This subsection (c) does not apply to any product with a specified effective date of 1/1/93 that is sold, supplied, or offered for sale in the Bay Area Air Quality Management District.*~~ This subsection (c) also does not apply to any consumer product which does not display on the product container or package the date on which the product was manufactured, or a code indicating such date.

(d) *Products registered under FIFRA.* For those consumer products that are registered under the Federal Insecticide, Fungicide, and Rodenticide Act, (FIFRA; 7 U.S.C. Section 136-136y), the effective date of the VOC standards specified in subsection (a) is one year after the date specified in the Table of Standards. For those consumer products that are registered under FIFRA, the *three year* ~~*eighteen month*~~ period provided in subsection (c) shall also begin one year after the date specified in the Table of Standards.

(e) *Products containing ozone-depleting compounds.* Effective January 1, l993, for any consumer product for which standards are specified under subsection (a), no person shall sell, supply, offer for sale, or manufacture for sale in California any consumer product which contains any of the following ozone-depleting compounds: CFC-11 (trichlorofluoromethane), CFC-12 (dichlorodifluoromethane), CFC-113 (1,1,1-trichloro-2,2,2-trifluoroethane), CFC-114 (1-chloro-1,1-difluoro-2-chloro-2,2-difluoroethane), CFC-115 (chloropentafluoroethane), halon 1211 (bromochlorodifluoromethane), halon 1301 (bromotrifluoromethane), halon 2402 (dibromotetrafluoroethane), HCFC-22 (chlorodifluoromethane), HCFC-123 (2,2-dichloro-1,1,1-trifluoroethane), HCFC-124 (2-chloro-1,1,1,2-tetrafluoroethane), HCFC-141b

(1,1-dichloro-1-fluoroethane), HCFC-142b (1-chloro-1,1-difluoroethane), 1,1,1-trichloroethane, and carbon tetrachloride.

(f) The requirements of section 94509(e) shall not apply to any existing product formulation that complies with the Table of Standards which is sold, supplied, offered for sale in California prior to the effective date of this article, or any product formulation that is sold, supplied, or offered for sale in California prior to the effective date of this article that is reformulated to meet the Table of Standards, ~~*as long as*~~ *provided* the ozone depleting compound content of the reformulated product does not increase.

(g) The requirements of section 94509(e) shall not apply to any ozone depleting compounds that may be present as impurities in a consumer product in an amount equal to or less than 0.01% by weight of the product.

(h) *Requirements for charcoal lighter materials.*~~*Requirements for Charcoal Lighter Material*~~ *The following requirements shall apply to all charcoal lighter material products as defined in section 94508(a)(15):*

(1) Regulatory Standards

(A) In all areas of California except the South Coast Air Quality Management District (SCAQMD),~~ *after January 1, 1993,*~~ no person shall sell, supply, or offer for sale *after January 1, 1993* any charcoal lighter material product unless at the time of the transaction:

1. the manufacturer or distributor of the charcoal lighter material has been issued a currently effective certification pursuant to subsection (h)(2).

2. the charcoal lighter material meets the formulation criteria and other conditions specified in the applicable Executive Order issued pursuant to subsection (h)(2).

3. the product usage directions for the charcoal lighter material are the same as those provided to the Executive Officer pursuant to subsection (h)(2)(C).

(B) In the South Coast Air Quality Management District, the regulatory standards specified in subsection (h)(1)(A) shall be applicable upon the effective date of this subsection.

(2) Certification Requirements

(A) No charcoal lighter material formulation shall be certified under this subsection unless the applicant for certification demonstrates to the Executive Officer's satisfaction that the VOC emissions from the ignition of charcoal with the charcoal lighter material are less than or equal to 0.020 pound of VOC per start, using the procedures specified in the South Coast Air Quality Management District Rule 1174 Ignition Method Compliance Certification Protocol, dated February 27, 1991 (the "SCAQMD Rule 1174 Testing Protocol"). *The provisions relating to LVP-VOC in sections 94508(a)(59) and 94510(d) shall not apply to any charcoal lighter material subject to the requirements of sections 94509(a) and (h).*

(B) The Executive Officer may approve alternative test procedures which are shown to provide equivalent results to those obtained using the SCAQMD Rule 1174 Testing Protocol.

(C) A manufacturer or distributor of charcoal lighter material may apply to the Executive Officer for certification of a charcoal lighter material formulation in accordance with this subsection (h)(2). The application shall be in writing and shall include, at a minimum, the following:

1. the results of testing conducted pursuant to the procedures specified in SCAQMD Rule 1174 Testing Protocol.

2. the exact text and/or graphics that will appear on the charcoal lighter material's principal display panel, label, and any accompanying literature. The provided material shall clearly show the usage directions for the product. These directions shall accurately reflect the quantity of charcoal lighter material per pound of charcoal that was used in the SCAQMD Rule 1174 Testing Protocol for that product, unless:

   I) the charcoal lighter material is intended to be used in fixed amounts independent of the amount of charcoal used, such as certain paraffin cubes, or
   ii) the charcoal lighter material is already incorporated into the charcoal, such as certain "bag light," "instant light" or "match light" products.

3. For a charcoal lighter material which meets the criteria specified in subsection (h)(2)(C)2.I, the usage instructions provided to the Executive Officer shall accurately reflect the quantity of charcoal lighter material used in the SCAQMD Rule 1174 Testing Protocol

for that product.

4. Any physical property data, formulation data, or other information required by the Executive Officer for use in determining when a product modification has occurred and for use in determining compliance with the conditions specified on the Executive Order issued pursuant to section (h)(2).

(D) Within 30 days of receipt of an application, the Executive Officer shall advise the applicant in writing either that it is complete or that specified additional information is required to make it complete. Within 30 days of receipt of additional information, the Executive Officer shall advise the applicant in writing either that the application is complete, or that specified additional information or testing is still required before it can be deemed complete.

(E) If the Executive Officer finds that an application meets the requirements of this subsection (h)(2), then he or she shall issue an Executive Order certifying the charcoal lighter material formulation and specifying such conditions as are necessary to insure that the requirements of this subsection (h) are met. The Executive Officer shall act on a complete application within 90 days after the application is deemed complete.

(3) Notice of Modifications

For any charcoal lighter material for which certification has been granted pursuant to subsection (h)(2), the applicant for certification shall notify the Executive Officer in writing within 30 days of: (I) any change in the usage directions, or (ii) any change in product formulation, test results, or any other information submitted pursuant to subsection (h)(2) which may result in VOC emissions greater than 0.020 pound of VOC per start.

(4) Revocation of Certification

If the Executive Officer determines that any certified charcoal lighter material formulation results in VOC emissions from the ignition of charcoal which are greater than 0.020 pound of VOC per start, as determined by the SCAQMD Rule 1174 Testing Protocol and the statistical analysis procedures contained therein, the Executive Officer shall revoke or modify the certification as is necessary to assure that the charcoal lighter material will result in VOC emissions of less than or equal to 0.020 pound of VOC per start. The Executive Officer shall not revoke or modify the prior certification without first affording the applicant for the certification an opportunity for a hearing in accordance with the procedures

specified in Title 17, California Code of Regulations, Division 3, Chapter 1, Subchapter 1, Article 4 (commencing with section 60040), to determine if the certification should be modified or revoked.

(5) Notwithstanding any other provision of this subsection 94509(h), charcoal lighter material products manufactured prior to January 1, 1993, may be sold, supplied, or offered for sale until July 1, 1994, in all areas of California except the South Coast Air Quality Management District. Charcoal lighter material products subject to SCAQMD Rule 1174 and sold, supplied, or offered for sale in the South Coast Air Quality Management District shall meet the requirements of section 94509(h) upon the effective date of this subsection, regardless of the date on which the products were manufactured.

(i) Requirements for aerosol adhesives. As specified in Health and Safety Code section 41712(h)(2), the 75 percent VOC standard 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.

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

94513. ~~*Registration*~~ *Reporting Requirements*

(a) *Upon 90 days written notice, the Executive Officer may require any responsible party to supply information for any consumer product or products the Executive Officer may specify including, but not limited to, all or part of the following information: ~~No later than 90 days after the effective date of this section 94513, all responsible parties for the following household and I&I products must register products that are sold in the State of California during the calendar year prior to the year the registration is due: (1) products for which a VOC standard is specified in Section 94509(a), (2) products approved as an innovative product under Section 94511, and (3) products claiming exemptions under Section 94510(f), Section 94510(g), or Section 94510(h). All registrations shall include the following information:~~*

(1) the name of the responsible party and the party's address, telephone number, and designated contact person;

(2) any claim of confidentiality made pursuant to Title 17, California Code of Regulations, Section 91011;

(3) the product brand name for each consumer product subject to registration and

upon request by the Executive Officer, the product label;

(4) the product category to which the consumer product belongs;

(5) the applicable product form(s) listed separately;

(6) an identification of each product brand name and form as a "Household Product", "I&I Product", or both;

(7) separate California sales in pounds per year, to the nearest pound, and the method used to calculate California sales for each product form;

(8) for registrations submitted by two companies, an identification of the company which is submitting relevant data separate from that submitted by the responsible party. All registration information from both companies shall be submitted by the date specified in Section 94513(a);

(9) for each product brand name and form, the net percent by weight of the total product, less container and packaging, comprised of the following, rounded to the nearest one-tenth of a percent (0.1%):

(A) Total Table B Compounds
(B) Total LVP-*VOCs* ~~*Compounds*~~ that are not fragrances
(C) Total All Other Carbon-Containing Compounds that are not fragrances
(D) Total All Non-Carbon-Containing Compounds
(E) Total Fragrance
(F) For products containing greater than two percent by weight fragrance, but excluding "personal fragrance products":
  (I) the percent of fragrance that are LVP-*VOCs* ~~*Compounds*~~, and
  (ii) the percent of fragrance that are all other carbon-containing compounds
(G) For "personal fragrance products", the density of the fragrance
(H) Total Paradichlorobenzene

(10) for each product brand name and form, the identity, including the specific chemical name and associated Chemical Abstract Services (CAS) number, of the following:

(A) Each Table B Compound
(B) Each LVP-*VOC* ~~*Compound*~~ that is not a fragrance

(11) if applicable, the weight percent comprised of propellent for each product;

(12) if applicable, an identification of the type of propellent (Type A, Type B, Type C, or a blend of the different types);

(b) In addition to the requirements of section 94513(a)(10), the responsible party shall report or shall arrange to have reported to the Executive Officer the net percent by weight of each ozone-depleting compound which is (1) listed in section 94509(e) and (2) contained in a product subject to registration under section 94513(a) in any amount greater than 0.1 percent by weight.

~~*(c) Upon 90 days written notice, the Executive Officer may also require any manufacturer to supply all or part of the registration data listed in Section 94513(a) for any consumer product or products that the Executive Officer may specify.*~~

~~*(d)*~~*(c)* All information submitted by ~~*manufacturers*~~ *responsible parties* pursuant to Section 94513 shall be handled in accordance with the procedures specified in Title 17, California Code of Regulations, Sections 91000-91022.

(d) Special Reporting Requirements for Aerosol Adhesives

On or before March 31, 1999, all responsible parties for aerosol adhesives shall submit to the Executive Officer the following information:

(1) data regarding product sales and composition for the year 1998, 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 limit. 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.

(e) Special Reporting Requirements for Hairsprays

This subsection (e) applies to each responsible party for any hairspray product that has greater than a 55 percent VOC content, if the responsible party intends to sell, supply, offer for sale, or manufacture the product for sale in California after January 1, 1998. Each such responsible party shall submit to the Executive Officer the following information:

(1) On or before January 1, 1998, a compliance plan shall be submitted that details the responsible party's schedule for achieving compliance with the June 1, 1999 55 percent VOC standard for hairsprays.

(2) Program updates for each compliance plan shall be submitted by the following dates: April 1, 1998, July 1, 1998, October 1, 1998, January 1, 1999, March 1, 1999 and May 1, 1999; except that the obligation

to submit updates shall cease when the responsible party achieves compliance with the 55 percent VOC standard.

(3) Each compliance plan and update shall include the projected sequence and dates of all key events pertaining to the development of 55 percent VOC hairspray formulas including, at a minimum, the following information: information on the types of formulations to be tested; formulation data; prototype testing; toxicity, corrosion, and stability tests; packaging and valve testing; safety and efficacy testing; consumer market testing and consumer acceptance testing; schedule for plant modifications and large scale production; the expected date of production of hairsprays that meet the June 1, 1999 standard; and a back-up plan that describes the manufacturer's intended actions should the chosen compliance method or technology not succeed.

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.

94514. Variances

(a) *Applications for variances.* Any person who cannot comply with the requirements set forth in Section 94509, because of extraordinary reasons beyond the person's reasonable control may apply in writing to the Executive Officer for a variance. The variance application shall set forth:

(1) the specific grounds upon which the variance is sought;
(2) the proposed date(s) by which compliance with the provisions of Section 94509 will be achieved~~;~~ **;**
(3) a compliance report reasonably detailing the method(s) by which compliance will be achieved**, and**
(4) for applicants requesting a variance from the June 1, 1999 55 percent VOC standard for hairspray products, the variance application shall also include a plan describing how the applicant will mitigate the excess VOC emissions that would be emitted during the period of the variance.

(b) *Notices and public hearings for variances.* Upon receipt of a variance application containing the information required in subsection (a), the Executive Officer shall hold a public hearing to determine whether, under what conditions, and to what extent, a variance from the requirements in Section 94509 is necessary and will be permitted. A hearing shall be initiated no later than 75 days after receipt of a variance application. Notice of the time and place of the hearing shall be sent to the applicant by certified mail not less than 30 days prior to the hearing. Notice of the hearing shall also be submitted for publication in the California Regulatory Notice Register and sent to every person who requests such notice, not less than 30 days prior to the hearing. The notice shall state that

the parties may, but need not be, represented by counsel at the hearing. At least 30 days prior to the hearing, the variance application shall be made available to the public for inspection. ~~*Information submitted to the Executive Officer by a variance applicant may be claimed as confidential, and such information shall be handled in accordance with the procedures specified in Title 17, California Code of Regulations, Sections 91000-91022. The Executive Officer may consider such confidential information in reaching a decision on a variance application. Interested members of the public shall be allowed a reasonable opportunity to testify at the hearing and their testimony shall be considered.*~~

(c) Treatment of confidential information. Information submitted to the Executive Officer by a variance applicant may be claimed as confidential, and such information shall be handled in accordance with the procedures specified in Title 17, California Code of Regulations, Sections 91000-91022. The Executive Officer may consider such confidential information in reaching a decision on a variance application. Interested members of the public shall be allowed a reasonable opportunity to testify at the hearing and their testimony shall be considered.

~~*(c)*~~*(d) Necessary findings for granting variances.* No variance shall be granted unless all of the following findings are made:

(1) that, because of reasons beyond the reasonable control of the applicant, requiring compliance with Section 94509 would result in extraordinary economic hardship.
(2) that the public interest in mitigating the extraordinary hardship to the applicant by issuing the variance outweighs the public interest in avoiding any increased emissions of air contaminants which would result from issuing the variance.
(3) that the compliance report proposed by the applicant can reasonably be implemented, and will achieve compliance as expeditiously as possible.

~~*(d)*~~*(e) Variance orders.* Any variance order shall specify a final compliance date by which the requirements of Section 94509 will be achieved. Any variance order shall contain a condition that specifies increments of progress necessary to assure timely compliance, and such other conditions that the Executive Officer, in consideration of the testimony received at the hearing, finds necessary to carry out the purposes of Division 26 of the Health and Safety Code.

~~*(e)*~~*(f) Situations in which variances shall cease to be effective.* A variance shall cease to be effective upon failure of the party to whom the variance was granted to comply with any term or condition of the variance.

~~*(f)*~~*(g) Modification and revocation of variances.* Upon the application of any person, the Executive Officer may review, and for good cause, modify or revoke a variance from requirements of Section 94509 after holding a public hearing in accordance with the provisions of subsection (b).

(h) Special conditions in variance orders for hairspray products.

In imposing conditions in variance orders granted from the June 1, 1999 55 percent VOC standard for hairspray products, the Executive Officer, in addition to any other conditions that may be imposed, shall require the applicant to mitigate the excess VOC emissions that would be emitted during the period of the variance. If this mitigation requirement would result in an extraordinary economic hardship to the applicant, or if other good cause exists, the Executive Officer may waive all or part of this requirement.

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

APPENDIX C:

COST CALCULATIONS FOR ECONOMIC IMPACTS ANALYSIS

(AVAILABLE ON REQUEST)