Promoting the Use of Low VOC Paint

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Project Number: CXP A048

PROMOTING THE USE OF LOW VOC PAINT

An Interactive Qualifying Project Report

submitted to

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of

SCIENTIFIC SERVICES LABORATORY

and

the Faculty

of the

WORCESTER POLYTECHNIC INSTITUTE

in partial fulfilment of the requirements for the

Degree of Bachelor of Science

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Date: 20 May 2004

1. paint
2. environment
3. consumer awareness

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Abstract

The goal of our project was to determine the reasons for Australian paint consumers' lack of interest in purchasing low VOC paint, and to present recommendations to Australian paint manufacturers, environmental organisations, and government officials on strategies to promote the use of this product. We identified cost, unawareness, and product quality as probable reasons for the poor sales of such paints. We also developed a brochure to help interested organisations and paint manufacturers improve sales of low VOC paint.

Acknowledgements

We would like to acknowledge Kenneth Lofhelm for his assistance in the completion of this project. Through his guidance and resources, we were able to achieve the desired results. We would like to thank Michael Hambrook and the Australian Paint Manufacturers Federation (APMF) for providing a letter of introduction for our survey and for supporting our research. We also thank all our interviewees, listed below, for their valuable contributions, as well as the forty-five painters and contractors who completed and returned our questionnaire.

The project advisors, Prof. Creighton Peet and Prof. Karen Lemone, were instrumental in the development of this project and report; we would like to thank them, along with the project centre coordinators, Prof. Jonathan Barnett and Prof. Holly Ault.

We are grateful to Ellen Lam, of Bristol Paint, and Fred Ardern, of the Australian EPA, who took time from their schedules to give us tours of their facilities. Ms. Lam explained and demonstrated the paint manufacturing process, while Mr. Ardern provided us with an overview of the process of measuring VOC emissions in the atmosphere.

Finally, we would like to thank Mahmut Horasan and Russell Kilmartin from Scientific Fire Services for allowing us the use of their office space and resources. Even though their business was not directly related to our project, they always showed incredible interest in and support for our activities and the results we achieved. Their friendship and aid, and that of employees Sandra McGuire and Brent Galloway, made our work most enjoyable.

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Authorship

Although each of the chapters of "Promoting the Use of Low VOC Paint" had a primary author (as listed below), the chapters were extensively revised, edited, and supplemented with additional information by all team members.

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List of Acronyms

AELA – Australian Environment Labelling Association
AGAL – Australian Government Analytical Laboratories
APAS – Australian Paint Approval Scheme
APG – Aberdeen Proving Grounds
APMF – Australia Paint Manufacturer Federation
CAA – Clean Air Act
CCME – Canadian Council of Minister of Environment
CEPA – Canadian Environmental Protection Act
CIA – Chemical Industry Association
CSIRO – Commonwealth Scientific and Industrial Research Organisation
DEH – Department of Environment and Heritage
EC – European Commission
ECETOC – European Chemical Industry Ecology and Toxicology Centre
EPA – Environmental Protection Agency (U.S.A.)
EPA – Environmental Protection Authority (Australia)
ESVOCG – European Solvent VOC Co-ordination Group
EU – European Union
GVRD – Greater Vancouver Regional District
IARC – International Agency for Research on Cancer
ICI – Imperial Chemical Industries
LRTAP – Long-Range Transboundary Air Pollution
MMC – Montreal Metro Community
MOU – Memoranda of Understanding
NEPM – National Environmental Protection Measure
OTC – Ozone Transport Commission
OTR – Ozone Transport Region
PC-OEM – Product Coatings
PM – Particulate Matter (the subscript number to the right of the abbreviation specifies the size, in nanometres, of the matter)
POS – Point of Sales
SEPP – State Environmental Protection Policy
SPC – Special Purpose Coatings
SSL – Scientific Services Laboratory
VOC – Volatile Organic Compound

Executive Summary

Air pollution is a persisting problem worldwide, despite recent efforts to decrease it. One of the most common air pollutants is the class of chemicals called Volatile Organic Compounds (VOCs). Many consumer products such as paint and household cleaners contain these chemicals, which are harmful to the environment and to health in several different ways. When mixed with sunlight and nitrogen oxide (NO_x), VOCs form ground level ozone, commonly known as smog, which can cause nausea, throat irritation, aggravated asthma, heart complications, and cancer. VOCs also contribute to the deterioration of stratospheric ozone. These and other negative effects have led to the development of products with reduced VOC emission levels. Specifically, the development of low VOC paint, along with its use in place of conventional paint, should help to address some of the concerns caused by the release of high amounts of VOCs into the air.

Low VOC paint was developed in Melbourne, Australia, as well as in many other countries. The consumer response to low VOC paint in Australia, in stark contrast to consumer response in the United States, for example, has been poor. The low sales have troubled the manufacturers, who have agreed to lower VOC content in paint for the benefit of the public's health and the environment.

The goal of this project was to determine the major causes behind the lack of public interest in low VOC paint and to present recommendations describing how the government, manufacturers, and environmental organisations can address each of these causes. These recommendations should be able to convince consumers to purchase low VOC paints instead of conventional paints.

In order to reach our goal, we appraised various aspects of the paint industry and market by interviewing and surveying manufacturers, local paint stores, distribution companies, and consumers. We used an approximation of sales statistics to evaluate the extent of the problem, since it was impossible to get exact information on these topics due to commercial secrecy. In order to discover the reasons behind the low sales, we obtained manufacturers' assessments of quality differences between conventional and low VOC paints. We also sought to learn from contractors what types of paints they used and their opinions of low VOC paints. These interviews helped us determine the main reasons why few paint consumers were using low VOC paints and provided a basis for our recommendations. Finally, we obtained knowledge about successful existing marketing and educational strategies from interviews with representatives from manufacturers' marketing departments, representatives from environmental organisations, and consumers. These models helped us determine the most efficient and effective ways to convince paint users to use low VOC paints.

We determined that the primary reason for the poor sales of low VOC paint was the fact that many people were unfamiliar with it. In addition, numerous paint contractors and individuals who knew about the paint were unaware of the harmful effects of VOCs to either human health or the environment. Price and some of the quality issues of the paint were other factors affecting sales. Paint consumers have complained that low VOC paints have some disadvantages, particularly those involving coverage, drying time, durability, washability, and the range of colours available. Few painters want to pay an extra 15% for a paint that they feel is inadequate in providing these basic characteristics. However, manufacturers would be willing to conduct more research to improve the quality of low VOC paint if they were to detect an increase in the consumers' interest in it.

To fulfil the second part of our goal, we assembled a series of recommendations for paint manufacturers, government officials, and environmental and health organisations, addressing the deficiency of low VOC paint sales. Our first recommendation was for the manufacturers to research and eliminate any defects in the paint formulation, as well as to follow guidelines from the Australian Paint Approval Scheme (APAS). Restarting advertisement for low VOC paint and establishing training programs for painters would help to increase the public's awareness of the paint. In addition, we suggested that APAS continue to lower VOC content in all water-based paints, but at a reasonable rate, such that the industry can respond without compromising the quality of the paint. The government should also target individual paint manufacturing facilities to reduce their emission of VOCs. Finally, we advised that an environmental or health organisation develop and distribute a brochure to educate the public about the dangers of VOCs. Following these recommendations should improve the sales of low VOC paints and help to create a healthier environment for all of us.

Chapter 1

Introduction

While tremendous efforts of government officials and environmental groups have reduced the emissions of many common pollutants, air pollution remains a problem globally. Among the most common air pollutants are a category of toxins called the Volatile Organic Compounds (VOCs), which, along with a long list of other regrettable attributes, is the main precursor to ground level ozone, a substance detrimental to both the environment and health. As a group, architectural paints release the second-most VOCs of all consumer products; limiting the amount of VOCs in paints should directly lead to an improved environment and reduction of health risks to the population.

In response to this logic (but more often directly due to increasingly stricter regulations), paint manufacturers have steadily lowered the VOC emission levels in their paints. Furthermore, some manufacturers have developed paint with an ultra-low VOC content of less than 5 g/L, a 90% to 99% reduction beyond the regulated limits. Although these paint products are often known as "low odour" or "low environmental impact" paints in Australia, the term "low VOC paint" will be used in this document to refer to them. For interior surfaces, low VOC paints are a much safer selection than conventional paints – and would ideally replace them – but the current rate of sales in Australia is too low for this to be possible. In fact, Australian consumers are not purchasing enough low VOC paint to make it a profitable product for manufacturers. The low sales of the paint may eventually cause its elimination from the Australian market, which would be a step backwards in the world's recent pursuit of all that is environmentally friendly. It would increase the difficulty of

Australian consumers to choose their paints for the health benefit of people and the world in which they live.

Much research has been done to catalogue the effects of VOCs on the environment and upon the health of the living world. The United States Environmental Protection Agency has found the major health concerns involved with VOC emission to be irritation of the eyes and respiratory system, asthma attacks, and cancer, in more serious cases. The United States, Canada, Europe, and Australia have enacted regulatory limitations on the amount of VOCs to be emitted by paints and other products in response to these environmental and health concerns, but the limits set in Australia are voluntary, and are thus far more lenient than those set in other countries. To address pollution issues, environmental organisations have produced environmental awareness brochures. For example, the Australian Environmental Protection Authority created several of them for the recent "Dairy Farm" campaign, which educated farmers about the environmental hazards of allowing polluted water runoff from their farms. However, these organisations have not taken any action to heighten the awareness of the damage VOCs in paint can do to the environment.

Prior to the completion of this project, paint manufacturers in Australia had stated their concerns about the poor sales of low VOC paint in Australia; however, research evaluating the validity of these claims had not been done, nor had any concerted efforts been made to explain these low sales. Although at least one manufacturer had created advertisements for a low VOC paint product at its initial release, there was no evaluation of the success of this campaign. Research had not been done to assess the level of public awareness of the environmental and health factors related to VOCs and the existence of the environmentally

friendly product. Finally, there had not been any investigation of public education methods in order to improve the environmental awareness related to VOCs in paints.

Based on these apparent gaps in the research on low VOC paint, the goal of our project was set to determine the major causes behind the lack of public interest in low VOC paint and to present a series of recommendations that, if implemented, could increase the sales of low VOC paints. To evaluate the extent of the problem, we gathered sales statistics from paint manufacturers and questioned consumers (mainly contractors and autonomous painters) about their use of this type of paint. To account for the low sales, we interviewed the manufacturers and large contractors and surveyed painters, asking each about the differences they found between low VOC and conventional paints. We were able to explain the causes in terms of the level of the consumers' knowledge about low VOC paints, their knowledge about the health and environmental issues, price differences, and quality issues.

Finally, after interviewing representatives from environmental organisations, we evaluated where improvements could be made, and recommended changes to the current system for public education about the harm of VOCs and the contrasting benefits of low VOC paint. If our recommendations were to be implemented, Australian contractors and autonomous painters, the primary consumers of paint, would be able to make more educated decisions when purchasing paints, and would choose low VOC paint because of its benefits. An outcome of our project, consequently, could be an improvement to the environment and health of Australia.

Chapter 2

Literature Review

Although no research had been performed to explain the meagre sales of low VOC paint in Australia, much has been published about topics related to VOCs and the paint industry – among them the harmful effects of VOCs, the development of low VOC paint, the regulation of VOCs emitted into the environment, and the paint market. Information about these topics, discussed in this chapter, is vital to understanding the rationale for this project, and essential to explaining why consumers should be encouraged to buy low VOC paint.

2.1 VOC Emissions from Paints

Volatile organic compounds (VOCs) are harmful chemicals containing carbon that evaporate easily into the air at room temperature (Minnesota Department of Health, 2003, para. 1). There are numerous consequences, detrimental to both the environment and health of living organisms, of the presence of these compounds in the air.

Although motor vehicle emissions are the primary artificial source of VOCs in the atmosphere, the contribution of solvent-based paints is the primary stationary source and is very significant (Michaels, 2001, para. 3). According to a decision by the U.S. Court of Appeals, "close to 100 percent of the VOC from paint is eventually emitted into the ambient air" (United States Court of Appeals, 2000, line 933). Thus, the lowering of VOC content in a manufactured paint would likewise lower the amount of VOC released from the paint into the air, making the goal of reducing VOC emission realizable.

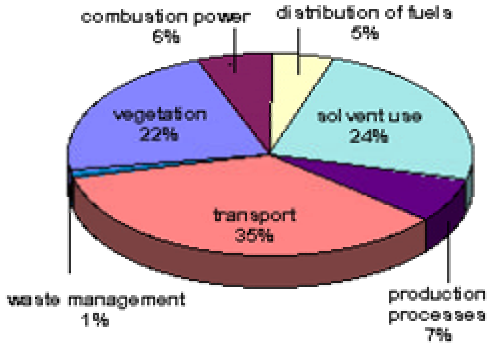

Figure 1 – Average Annual VOC Emissions in Europe

(Source: European Solvents Industry Group, 2003, Average Annual VOC Emissions)

In Europe, 24% of the total VOC emission is from paints and other solvents, as shown in Figure 1 (European Solvents Industry Group, 2003, pie charts). Furthermore, 7% of VOC emission is from production processes, which include paint manufacturing. However, the major source of VOC emission remains the motor vehicles, contributing of 35% of the total VOC in the air.

In 1999, the United States National Emission Inventory showed the total VOC emission to be 18.44 million metric tonnes annually; from which 2.17 million metric tonnes (12%) were from surface coatings and paint use (Environmental Roadmapping Initiative, 2003, Sec. Quantitative Impact Data). Architectural paints released 438 thousand metric tonnes of VOC (2.4% of total emission) into the air.

In 2002, the National Pollution Inventory (Department of the Environment and Heritage, 2004) in Australia reported the total VOC emission (disregarding biogenic emissions) to be 0.7 million metric tonnes, from which 34 thousand metric tonnes (5%) were from architectural surface coatings. As the U.S. and Australia have different methods for measuring pollutant emissions, both cautioned against direct numerical comparisons.

These data have shown a substantial amount of VOC emission in all three areas to be due to paint production and application. Therefore, a reduction in VOC emissions from paint would have a significant effect on overall emissions.

2.1.1 Environmental Risks of VOC Emissions During and After Painting

VOCs remaining in liquid paints are not harmful; they are only detrimental once they have evaporated into the air: during the process of painting and drying. When outdoors, VOCs react with nitrogen oxides (NO_x) in the presence of sunlight to form ground level ozone, a major component of photochemical smog, which is deleterious to the health of plants, animals, and humans. The level of NO_x in the air, the season, and the type of VOC involved in the reaction all contribute to determining the amount of smog produced.

The stratospheric ozone layer, which filters the harmful ultraviolet rays in sunlight, can be destroyed by VOCs that can reach the stratosphere without being completely filtered (Hester, 1995, p. 3). Soil and water, two other possible VOC pollution targets, are not affected by VOC emission into the air, as VOCs remain airborne once evaporated[1].

[1] Soil and water pollution can be caused by the actual spillage of products high in VOC, but this is attributed to improper handling techniques and not to normal use. Handling techniques for paint are explained in detail in Christopher, Graybeal, and Wadlinger's (2001) IQP titled Consumer Awareness of Domestic Paint Use and Disposal.

2.1.2 Health Risks of VOC Emissions During and After Painting

Health concerns involved with VOCs are due partially to the deadly smog to which they contribute. However, even before any chemical changes, VOCs pose a threat to the well being of any humans and pets that are indoors. While symptoms depend largely on the person, the situation, and the chemistry of the VOCs involved, they can range from mild respiratory irritation to permanent damage to the liver, kidneys, and central nervous system (Environmental Protection Agency, 2003, para. 4). Cancer can be caused in animals and possibly humans after long-term exposure to VOCs. During painting-related activities, the level of VOCs in the indoor air can approach one thousand times the normal outdoor level, creating an environment to which even limited exposure can trigger symptoms and long-term damage.

A clinical study was done in Australia to determine how conventional water-based paints and low VOC paints affect people who had previously reported worsening of asthmatic symptoms while painting (Beach et al., 1997, Sec. Abstract). The study reported that there were no significant differences in lung and/or airway function when either type of paint was applied. Despite the medical data, reports of "wheezing" and "breathlessness" were substantially increased when conventional paints were used.

There are many more occupational health risks of the prolonged exposure to VOCs during and after painting. These risks include skin disease, lung irritation, and occupational asthma (Brown, 2000, p. 30). Chemical compounds found in paint such as ethylene glycol ethyl ether and ethylene glycol methyl ether are said to be responsible in reducing the sperm counts in a group of painters.

Furthermore, the International Agency for Research on Cancer (IARC) (1989, Sec. Overall Evaluation) declared that extended occupational exposure to paint should be considered carcinogenic to humans. Although the specific agents in paint that cause cancer were not identified, the IARC noted that VOCs in paints (such as benzene, dichloromethane, carbon tetrachloride, tetrachloroethylene, epichlorhydrin, toluene-2,4-diisocyanate) were known carcinogens.

Clinical studies done by Scandinavian countries show that VOC damages the central nervous system (Brown, 2000, p. 31). Since nearly all organic solvents act as intense suppressant to the central nervous system, it was expected that VOC in paints would cause minor to serious neurobehavioral dysfunction or psychiatric disorders. The report of this result received many criticisms because similar reports from other countries were not found. However, the interior paints were mainly sprayed onto walls in Scandinavian countries, which results in much more solvent exposure than applying paints with a roller or brush. A review in 1992 found that consequences to long-term occupational exposure to VOCs could include neurobehavioral effects, neurophysiologic effects, and alterations in sensory capacity.

2.2 Low VOC Paint

Because of the harmful effects of VOCs in paints being released into the environment and the many health risks concerning VOCs in paint, manufacturers, acting with the encouragement of environmental groups and government laboratories, have developed low VOC paints. The discoveries of new formulae allow these paints to have a lower VOC content than conventional paints, reducing the damage caused by use of the paint.

2.2.1 Classification of Paints

To understand the potential damage caused by VOCs from paint, we investigated the different types of paints on the market and their VOC content. Paints are separated into two major classes, architectural and industrial paints. Architectural paints are subdivided into two categories: water-based (latex) and solvent-based (alkyds). Although VOCs are found in both categories, each of them contains a different amount. Because of their lower solvent content, water-based paints have a lower VOC percentage than solvent-based paints (Hurs-Wajszczuk, 2003, para. 3, 6). Within the category of water-based paint is a special class called *low VOC paint* – the focus of our project – that contains even fewer VOCs than standard water-based paint. Because most VOCs come from the solvents in paints, it is impossible to make any reasonable low VOC paint in the solvent-based paint category. When comparing architectural paints, it is often enough to compare water-based paints and solvent-based paints because low VOC paints are simply a special class of water-based paints, and thus inherit almost all of the positive attributes of water-based paints.

Each category of paint has its own advantages and disadvantages. The most notable advantage of water-based paints over solvent-based paints is the lower odour when water-based paints are applied. This is convenient, for example, in an office where the interior needs to be painted while people work nearby. The office workers would be less troubled than they would by the offensive (and hazardous) fumes emitted by solvent-based paint (American City & County, 1996, para. 8).

Water-based paints can be applied easily with a brush, roller, or spray, after which they dry quickly. Many of these paints are stain-resistant, meaning that any type of stain can be

cleaned up with just soap and water. The versatility of the paint is also notable. They can be applied to surfaces such as drywall, plastic, metal, and wood (American City & County, 1996, para. 6).

While water-based paints have advantages, there are also many advantages to the use of solvent-based paints. Solvent-based paints have a higher VOC content, which is unfortunate for emissions, but also causes them to be much stronger and harder than water-based paints when dried. This is advantageous for exterior painting because the paints endure abrasion and can last longer under harsh conditions. Many solvent-based paints show good flow and levelling, which results in a smoother surface (without brush marks) when the painting is done. Furthermore, due to their chemical differences, solvent-based paints can be applied at a lower temperature than can water-based paints (American City & County, 1996, para. 9-10).

The decision on which category of paint to use depends on the surrounding conditions and the surface of material that is being painted. For example, some water-based paints are known to prevent mildew from growing, as a result of the additive mildewcide in the paint. This is helpful if the surface will be exposed to a humid or moist environment. Solvent-based paints, on the other hand, are not as beneficial in this respect; it has actually been shown that some can possess nutrients that will actually promote the growth of mildew (American City & County, 1996, para. 11).

Low VOC paints are beneficial to the environment, of course, and share many of the same benefits as water-based paints. In addition, there are, at least in the United States, cost benefits related to the use of low VOC paints. The Department of Defense's pilot project at

the Aberdeen Proving Grounds (APG) provided evidence that low-VOC paints were typically about US$0.50 less per litre than high-VOC paints (Environmental Protection Agency, 1999, p. 15). APG noticed a monthly savings totalling to an US$528 for the thousand litres of paint they purchased. In addition, since the APG's paints were low in VOCs, leftover paints did not need to be catalogued as hazardous waste (as high-VOC paints must be). Consequently, the APG facility saved an extra US$25,000 in disposal costs annually.

2.2.2 History and Development of Low VOC paints

The paint industry has undergone many changes since its beginning, with the development of new products and removal of old products due to changes in technology, demand, and regulations. In their chronological order of development, there have been solvent-based paints, lead-based paints, water-based paints, and low VOC paints. The use of lead-based paints has been outlawed in many countries because of the acute hazards they bring to human health. The existence of solvent-based paints and water-based paints are common knowledge to most paint consumers, while the subclass of low VOC paints are not as well known due to their recent development.

2.2.2.1 Development of Low VOC Paint in the United States

The development of low VOC paints in the United States was very uneventful. As people became more aware of the health risks in paint and the general concern for air quality rose, the demand for a lower content of VOC in paints increased (NAHB Research Center, 2004, Sec. Details). Manufacturers, under the pressure of consumer demands and government regulations, had no choice but to rise to the challenge of developing quality paints with drastically low levels of VOCs. American Formulating and Manufacturing has developed a

line of paints that contains a lower amount of VOCs and other toxic chemicals than water-based paints (Graham, 2004, para. 7). The company is focused on improving the quality of water-based paints and decreasing the emission of hazardous compounds, ideally to a level of one gram of VOC per litre.

2.2.2.2 Development of Low VOC Paint in Australia

In 1994, Dulux, the largest paint brand in Australia, launched a product named *BreatheEasy*® and marketed it as "an environmentally responsible" paint (Keene, personal communication, 29 March 2004). At that time, Dulux was a part of the international company Imperial Chemical Industries (ICI) and the product was launched in conjunction with a similar product made by its sister company in London. This was the first time low VOC paint was introduced in Australia. In 1998, the paint was taken off the market because of low sales and relaunched with a different brand name, Berger *BreatheEasy*®. Although Dulux and Berger are both owned by Orica (as ICI Australia was renamed to in 1998), Berger is considered a second-tier paint brand and is less well known than Dulux. Berger *BreatheEasy*® can be found at local hardware stores, marketed as a healthy paint approved by Asthma Victoria.

The second largest paint manufacturer in Australia, Wattyl, also claims a share of the low VOC paint market. The name of their paint is *CleanAir3*®, and it was released initially for use in the 2000 Sydney Olympics. The Sydney Olympics were called the "Green Games"; the athletes' villages were painted with only low VOC paints (Rankin, personal communication, 23 March 2004). Both Dulux and Wattyl representatives claimed that the Olympics were their company's greatest low VOC paint success story – low VOC paints have been on the shelves ever since.

To ensure that the smaller paint manufacturers can develop technologies as quickly as Dulux and Wattyl, and in response to a desire to make paints healthier and better for the environment, a voluntary labelling scheme was put in place by the government in order to lower the level of VOCs in paint. In mid-2001, the Executive Officer of the Australian Paint Approval Scheme (APAS), Kenneth Lofhelm, began discussions with the Australian Paint Manufacturers Federation (APMF) regarding the future of an existing agreement concerning VOC emissions, which was to expire at the end of that year (Australian Paint Approval Scheme, 2003, para. 1-5).

Figure 2 – APAS and APMF Agreement Meeting
APAS Executive Officer Ken Lofhelm (left) with AGAL General Manager Dr. Sandra Hart and APMF Executive Director Michael Hambrook following the presentation of the new VOC reduction agreement (Source: Australian Paint Approval Scheme, 2003, Latest Round of VOC Reduction)

The negotiation to reduce the levels of VOCs in Australia's paint products was finalized in April of 2002, when both manufacturers and the government committed to reduce the amount of VOC emitted from paint to levels that correspond to those of other developed countries. The new agreements became effective in January of 2003 and will be effective until 2008, when a new agreement for VOC emission reduction will be negotiated.

APAS hinted that if the industry chooses to neglect the social demand of lowering the VOC emission in paint (by not participating in the labelling scheme), there is a high possibility that the government will impose regulations, which may be written by people who do not understand the local industry's technical capabilities (Australian Paint Approval Scheme, 2003, Sec. Close consultation). With this gentle warning, the industry realized that it could not "sit back and do nothing"; APAS has given the paint industry enough time to develop new products with lower VOC contents, while keeping the quality of the paints intact.

2.2.3 Marketing Strategies for Low VOC Paint

Like any other product, the success of low VOC paint requires consumers to be aware of its existence and to have a reason to purchase the product. Marketing and public education perform this important function in product development. The term *marketing* is often used to refer to how manufacturers try to influence the public to purchase a specific brand of product, but we will be using it in the sense of influencing the public to purchase not a specific brand, but a specific type: low VOC paint. Several marketing and educational strategies, which have been used or are currently in use, are presented in this section. The research method that served as the basis for this section is detailed in the Methodology Chapter.

With the initial public release of the first low VOC paint in Australia in 1994, a small television advertising campaign was begun. With a catchy name for the paint, *BreatheEasy*®, Dulux attempted to persuade consumers to purchase low VOC paints for their environmental benefits, at a time when they thought people were beginning to realize the importance of preserving the environment (Keene, personal communication, 29 March 2004). The advertising campaign did not have a positive result in terms of changing the buying habits of the public. When *BreatheEasy*® was marketed as a Berger product, the focus of the advertisement was changed to emphasise the lack of toxic fumes emitted by the paint while in use. This advertisement made little mention of the harm VOCs cause to the environment, and the relative benefits to the environment provided by low VOC paint. Unfortunately, the effect of each marketing campaign was "not significant".

In the United States, a similar strategy as that used to market Berger *BreatheEasy*® has been employed to convince consumers to purchase low VOC paint. Appealing to customers' sense of smell is a powerful tool – stating and even demonstrating the low odour of low VOC paint has proven to be quite successful for American paint manufacturers. For example, one approach the Sherwin-Williams Company has taken involved sending marketing representatives to potential customers (contractors and government officials) with several sample cans of the low VOC paint (Weiner, personal communication, 16 February 2004). While they gave a presentation about the many benefits of the paint, the sales associates left the gallons of paint open in one part of the room. After concluding the academic portion of the presentation, they indicated the open paint cans and pointed out the complete and remarkable lack of odour in the room.

Because of demonstrations such as this, low VOC paints are "very, very popular" in America, says Mark Weiner, of his company's (Sherwin-Williams) product. By modelling Australian marketing strategies after seemingly highly successful marketing and educational campaigns such as Sherwin-Williams', the Australian public will hopefully consider more than merely the price of the paint before they make a purchase.

2.3 Regulations

Although no regulations currently mandate the use of low VOC paints anywhere in the world, government regulations are still perhaps the most direct way to limit the emission of VOCs from conventional paints, and to encourage the development of low VOC products. The percentage of emission due to coating materials (paints) makes up a major portion of the consumer products that contain VOCs. In Europe alone, more than one third (approximately one million metric tonnes per year) of the annual VOC emission is the result of the application of coating (Almeida, 2001, p. 19). It is therefore no surprise that environmental organisations such as the Environmental Protection Agency (EPA) in the United States and Environmental Protection Authority (EPA) in Australia have been very active in attempting to implement standards and regulations for VOC emissions.

2.3.1 International Regulations

Because emissions of VOCs are a worldwide problem, a protocol was negotiated between the United States and the countries of Europe in the Convention on Long-Range Transboundary Air Pollution (LRTAP) in 1979. The purpose of the protocol was to limit emissions of VOCs and the resulting ground-level smog. The protocol included two methods. The first method presented a number of choices for the countries to "freeze or reduce" VOC emission in their

country. The second method mandated the use of technology-based controls for stationary sources, motor vehicles, and products that give off VOCs (Hunter et al., 1998, pp. 539 – 541).

Europe preferred the first method, which provided countries with different ways to meet the emission reduction requirement, considering both their economic situation and their potential to cause transboundary pollution (Hunter et al., 1998, pp. 539 – 541). Under article two, paragraph two of the protocol, countries were required to reduce VOC emissions 30% from the base years 1988 to 1999. However, countries could choose different base years, such as from 1984 to 1990, and the 30% reduction had to be shown to have occurred over that period.

The United States, which favoured the second method, found that there were some reasonably uncomplicated and economical means to significantly lower VOC emissions (Hunter et al., 1998, pp. 539 – 541). The second method of the protocol was designed to explore the possibility of lowering VOC emissions with current technologies. This was proposed for those countries that had not yet been using technology controls but had the capability and monetary support to consider this option. Two protocols could be used to satisfy the second method. The first was the NO_x Protocol, which required both a freeze in emissions and technology-based controls. The second was the SO_x Protocol – which the United States did not sign – which only expected the emission of VOC to be reduced, even in a very small amount.

Although not every country conformed to this protocol, and each country had its own standards and expectations on how to lower VOC emissions, this international protocol has unquestionably provided the mind-set and objective to lower VOC emissions globally.

2.3.2 Regulations in the United States

The United States has a number of national and state regulations regarding the emissions of VOCs from paint. The Federal Clean Air Act (CAA) was implemented in 1963 and completely rewritten in 1990 (Mendocino County, 2003, 1970 Amendments). The CAA gives the EPA the authority to set the National Ambient Air Quality Standard and includes emission standards for hazardous air in section 109. The CAA firmly restricts the emission of VOCs from primers and undercoats not to exceed 350 g/L. Furthermore, the final EPA ruling in 1998 limits VOC contents from flat interior and exterior paints to 250 g/L and non-flat interior and exterior paints to 380 g/L (Environmental Protection Agency, 1998, Sec. II.B). Moreover, the U.S. Congress created the Ozone Transport Commission (OTC) in 1990 to help resolve problems in the Ozone Transport Regions (OTR). The OTC sets a slightly stricter standard than the federal standard for the content limit of VOCs in paint.

Overall, the regulations in the United States have been both effective and cost efficient. VOC emissions from consumer coatings were reduced by 16% between 2000 and 2001, at a cost of US$1,500 per tonne of VOCs, an amount much less than the expected cost of US$3,100 per tonne of VOCs (USAF Air Logistics Centers and Otis ANG Base, 2001, Table 11).

2.3.3 Regulations in Canada

VOC emission regulations in Canada are divided into four levels: joint federal/provincial/territorial, federal, provincial/territorial, and municipal (Federal Minister of Environment, 2003, Sec. 3.3.1). On the joint federal/provincial/territorial level, eleven codes, guidelines, or Memoranda of Understanding (MOUs), have been issued by the Canadian Council of Minister of Environment (CCME) based on the 1990 CCME Phase 1 NO_x/VOC

Management Plan. Seven of these MOUs have posted limits on VOC content of products. Since the codes are only assumed to have been used, the success of the implementation of the code is hard to determine.

The Canadian federal government has modelled the Consumer Production Regulation after the U.S. Clean Air Act (s183e) and produced the Canadian Environmental Protection Act (CEPA) Guidelines for Volatile Organic Compounds in Consumer Products (Federal Minister of Environment, 2003, Sec. 3.3.2). The Canadian Environmental Protection Act Regulation for Solvent Degreasing is also implemented to aid reducing VOCs in the environment. Environmental groups such as Environment Canada provide an Environmental Choice Program to encourage the supply of and demand for more environmentally friendly products.

Provinces/territories have also tried to contribute to the reduction of VOCs in the air. Operating permits and ozone episode alerts are examples of attempts to reduce VOC at the provinces/territories level. However, regulations at this level have not been successful because most facilities that have operating permits do not contain VOC reduction apparatus (Federal Minister of Environment, 2003, Sec. 3.3.3).

Municipalities in Canada have been active in the reduction of VOC levels, particularly in the Greater Vancouver Regional District (GVRD) and the Montreal Metro Community (MMC). Part of the MMC provides guidelines for VOC emissions from consumer products, specifically dealing with spray-gun application and ventilation (Federal Minister of Environment, 2003, Sec. 3.3.4).

Despite all the efforts of the government to regulate and lower VOC emissions in consumer products, currently the VOC emission level is rising in Canada. This has been blamed on the lack of enforcement of regulations throughout all levels of the government (Federal Minister of Environment, 2003, Sec. 3.3.5).

2.3.4 Regulations in Europe

Until recently, there had been very little regulation of VOC emissions from paint in Europe. Many European manufacturers produce so-called "natural" paints, which do not contain any harmful chemicals. There are two categories of natural paints: milk paints and mineral paints. The name of the paint indicates the base material from which the paint is made. Because this environmentally friendly product was commonly used in Europe, it seemed excessive to have regulations limiting VOC emissions from paint (Sawatzky & Kaba, 2003, p. B6).

However, due to increasing popularity of water- and solvent-based paints, the European Union (EU) has recently set limitations on the VOC emission level. Under the EU Council Directive 1999/13/EC, countries must meet one of the following limits: 1) emission limit value in gases and emission value or 2) the total limit value or 3) implement a solvent reduction scheme. Before this official regulation, the Europeans had adopted an eco-labelling system in 1992 to ensure that consumers could identify environmentally friendly products as such (Federal Minister of Environment, 2003, para. 1, 5).

In the United Kingdom, the level of VOCs in water-based paints is mandated to be less than 10% or 99.96 g/L (ICI Dulux Paint, 1999, Paint and the environment). Paint manufacturers there have made progress in developing paints that do not just meet this regulation, but also

have even lower VOC concentrations. The U.K. paint industry, in 1998, implemented guidelines for labelling levels of the emission of VOCs from paint. These guidelines are presented in Table 1.

Table 1 – VOC Labelling Guidelines for Dulux Paints

Labelled VOC Level	VOC Percentage of Content
Minimal	0 to 0.29%
Low	0.30% to 7.99%
Medium	8% to 24.99%
High	25% to 50%
Very High	more than 50%

(Source: ICI Dulux Paint, 1999, Paint and the environment)

In January 2003, the European Commission (EC) proposed to the EU for the first time a set of limits for solvent content (Milmo, 2003, pp. 6-7). This legislation has two stages; the first will be fully effective in 2007, and the second will start in 2010. The legislation, drafted with the help of the European Solvent VOC Co-ordination Group (ESVOCG), the Chemical Industries Association (CIA), and environmental organisations (European Solvents Industry Group, 1998, p. 1), plans to limit the VOC in paints in stages to reach the eventual goal of a 50% reduction in all types of paints. The first stage of the legislation will limit VOCs in water-based paints to 150 g/L and solvent-based paints to 400 g/L. In the second stage, the VOC limit will be lowered to 100 g/L for both categories of decorative paints (European Council of the Paint, 2001, p. 2). The operation will cost between EUR 108 million (US $114 million) and EUR 157 (US $166 million) per year. Although it appears expensive, the legislation will provide benefits to improve air quality with an estimated value of well over EUR 580 million (US $612 million) (Milmo, 2003, pp. 6-7).

2.3.5 Regulations in Victoria, Australia

Regulations in Australia are similar to those in other countries. Although there are no national air quality emissions standards in Australia, the Australian government, especially in the state of Victoria, claims to be serious about keeping ambient air quality to a certain standard, and the government has a high priority to keep the air clean and healthy for its citizens (Department of the Environment and Heritage, 2003, Emission Standards).

The Commonwealth of Australia has no direct legislative power over any states; thus, air quality emission standards are left up to the states to determine. Nationally, Australia adopted the Environmental Protection Act in 1970 and later the State Environmental Protection Policy (SEPP) (Environmental Protection and Heritage Council, 2002a, p. 20). The Environmental Protection Authority in Victoria, in July of 1998, was one of the first states to implement the Ambient Air Quality National Environmental Protection Measure (NEPM) under the SEPP, for the six most common air pollutants (Environmental Protection and Heritage Council, 2002b, p. 136). These pollutants are, according to the American Lung Association (2003, Six Major Air Pollutants), carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), particulate matter (PM), and lead (Pb).

Between 1991 and 2001, there was a notable decrease in Australia in four of those key pollutants – CO, NO_2, SO_2, and Pb – but an increase in ozone and PM (Fyfe, 2004, p. 9). PM is classified into two sizes, PM_{10} and $PM_{2.5}$. An increase of PM_{10} is linked with an increase in respiratory problems, aggravation of asthma and even premature death, while $PM_{2.5}$ (most VOCs are considered $PM_{2.5}$ pollutants) can cause lung and heart disease and premature death (Ardern, personal communication, 2 April 2004). Sydney has excessive levels of $PM_{2.5}$, but

Melbourne was below the national standard for both air pollutants (O_3 and PM) (Fyfe, 2004, p. 9).

To ensure that the standards are met, the state of Victoria continues to monitor $PM_{2.5}$ (particles smaller than 2.5 micrometers in diameter) to fulfil the "Future Action" commitments. The EPA also has an outreach program focusing on local issues. The state launched the Ambient Air Quality Forecasting System developed by the EPA, the Commonwealth Scientific and Industrial Research Organisation (CSIRO), and the Bureau of Meteorology (Environmental Protection and Heritage Council, 2002b, p. 136). In April 2004, state and federal environmental officials installed a national monitoring system for an additional five air toxins, benzene, polycyclic aromatic hydrocarbons, formaldehyde, toluene, and xylene (Fyfe, 2004, p. 9), many of which can be found in water-based paints.

The Australian Paint Approval Scheme (APAS) is the most widely used paint scheme in the world. The APAS was created to test and certify paints in Australia to ensure the product meets performance specifications (SSL, 2003, para. 2). If a manufacturer chooses to go through the approval process, it has to provide information about the raw materials used, the percent mass of each raw material in wet paint, the mass percentage of VOCs in each raw material, and the mass of VOCs in wet paint. The manufacturer can provide all this information in gram per litre format instead of in mass percentages (APAS Executive Officers, 2001a, pp. 1-2). The approval is valid for five years, provided that there are no major changes to the formula of the paint (APAS Executive Officers, 2001b, p. 3).

In document D181 of the APAS, limits for VOC in paint are specified (APAS Executive Officers, 2001 c, pp. 1-4). The formula to calculate the content of VOC is:

$$\frac{\text{mass of volatiles (g)} - \text{mass of water (g)} - \text{mass of exempt volatiles (g)}}{\text{volume of wet paint (L)}}$$

Furthermore, APAS defines that any organic chemical with a vapour pressure less than 0.01 mm Hg at room temperature (21°C) or with a boiling point higher than 250°C as non-volatile. Once the amount of VOC in the paint is determined, it must meet the limits shown in Table 2.

Table 2 – VOC limits in paint set in 2000

Type of Paint	Product Name	Limits (g/L)
Water-Based	Interior/Exterior Undercoat	80
	Interior Sealer	80
	Interior Gloss	100
	Interior Semi Gloss	100
	Interior Sheen	80
	Low Odour/Low Environmental Impact	*5*
Solvent-Based	Primer	400
	Sealer	450
	Interior semi Gloss	450
	Interior undercoat	400

(Source: APAS Executive Officers, 2001c, pp. 1-4)

The regulations seem to work quite well for Victoria. The Air Monitoring Report 2002 stated that in general, air was clean in the state. Compared to urban centres worldwide, Melbourne had relatively good air quality, and the air quality was consistent with data from recent years. Although air quality was good in general, the goal for visibility had not been met, and there were still five smog events in the Melbourne-Geelong region for the year 2002, which was said to be a "typical" number (Environmental Protection Authority: Victoria, 2003, Overview).

2.4 Paint Industry and the Market

To understand the reasons behind the lack of consumer interest in using low VOC paints, and therefore the poor sales of low VOC paints in Australia, we compiled statistical information on paint manufacturers, the paint industry and on each subdivision of the paint industry. For the purpose of comparison, the market research was based on gathering statistical data worldwide, concentrating more, however, on the United States of America and Australia.

Production in the worldwide paint industry is worth over US$34 billion annually, and it is divided into three main categories: architectural coating, product coating, and special purpose coating. Architectural Coating or Decorative Paint represents the category of paint that is applied to both the interior and exterior surfaces of both residential buildings (houses and apartments) and non-residential buildings (hospitals and schools). This paint is used not only to beautify these buildings but also to protect the surfaces and conserve material resources. Product Coatings (PC-OEM) or industrial paints are most commonly found on manufactured products, such as vehicles, but also on bridges and roads. Finally, Special Purpose Coating (SPC) is paint that is produced upon the request of consumers, for example, for walls and furniture that require extra protection, or for people that suffer from asthma (Huang, 1996, p. 1).

2.4.1 United States Paint Industry and Market

In 2001, based on National Paint and Coating Association in the U.S., manufacturers developed annually approximately 190 million litres of architectural paints for residential and non-residential buildings. Generally, paint manufacturers sell about 8 litres per year of domestic paint per person (Christopher, Graybeal, & Wadlinger, 2001, p. 3).

In 2002, the U.S. market for paints and coatings was 4.9 billion litres, worth approximately US$14 billion (Huang, 1996, p. 1); architectural paints represented 2.7 billion litres (55%), and the rest was industrial and special purpose coatings (United Soybean Board, 2003, p. 1).

Table 3 – Architectural Paint Usage in the U.S. in 2002

Products*	Litres (in Millions)
Water-based:	
Interior	1540
Exterior	689
Total	**2229**
Solvent-based:	
Interior	185
Exterior	269
Total	**454**

***Note: An additional 17 million litres were unclassified**

(United Soybean Board, 2003)

The data in Table 3 show how many litres of each subdivision of architectural paint were used in 2002. Water-based paints composed the highest amount of produced paint in the architectural coating division. Although it would be useful to calculate the amount of VOCs emitted from the figures shown in this table, the emission of VOCs depends largely on the types of VOCs and the amounts of those particular VOCs in the paint (Brown, personal communication, 31 March 2004). This would require knowledge of the specific formulae used for the paints, knowledge which paint manufacturers are disinclined to disclose for reasons of trade secrecy.

There was an increase in the amount of architectural paint manufactured from the year 2001 to 2002 in the U.S. This growth, of about 841 million litres, was primarily correlated to an increase in the sales of water-based paint, the dominant subdivision of architectural coatings. Although reasons for this growth in sales are not evident, this is a growth that can be

compared to sales in Australia, throughout and following the period of the implementation of any recommendations which result from this project.

2.4.2 Australian Paint Industry and Market

The production of paint in Australia began in the year 1850, although the majority of the paint used at this time was still imported (APMF, 2004a, Sec. History of Paint Production in Australia). Locally manufactured paint began to dominate the market in the twentieth century; in 1927, approximately AUD$4 million worth of paint was sold, 78% of it produced locally. The following years showed an increase in both employment and sales in the paint industry; in 1975, 140 paint firms were identified, with annual sales of AUD$265 million.

In the past ten years, the production of architectural paint has increased from 50% to 55%. In 1998, architectural paints accounted for 55% of the total paint production in Australia, and industrial paints and special purpose coatings made up the remaining 45% (APMF, 2004a, Sec. History of Paint Production in Australia).

The most significant development over the past twenty years has been the growth in the production of water-based paints. Initially, the demand for this newly developed product was negligible, but as people became more aware of it, the demand increased. Currently, 52% of paints produced are water-based and 48% solvent-based (APMF, 2004b, Sec. Market Growth). Despite the high production of water-based paints, less than one percent of architectural paint produced is low VOC paint (Rankin, personal communication, 23 March 2004).

After architectural paint is manufactured in Australia, it is distributed to two types of paint consumers – individuals and contractors – who each receive a different type of paint. Individuals shopping at retail stores will generally purchase retail paints, which are of very high quality, but are also the most expensive, because of manufacturer advertisements and the low-volume purchasing. Painting contractors, however, commonly obtain their paint through trade routes. Trade paints are typically less expensive because they are not advertised, and are purchased in larger quantities. Trade paints are often of a slightly lower quality than their retail counterparts. The volumes of trade and retail paints sold are approximately equal (Keene, personal communication, 29 March 2004).

2.5 Summary

Because of their adverse short- and long-term effects on human beings, animals, and the environment, volatile organic compounds should be a major concern to all. Studies documenting their effects have led to stricter government regulations throughout the world, along with a shift toward lower VOC products in the paint industry and the development of low VOC paint. Research on these topics, along with information about the paint industry and market, formed the background necessary for a comprehensive investigation of why low VOC paints are not a popular alternative to conventional paints in Australia.

Chapter 3

Methodology

The goal of this project was to explain the poor sales of low VOC paint in Australia[2], and to develop recommendations that the government and industry can use to address this problem. In order to achieve this main goal, we defined and achieved several objectives, which are presented in this chapter along with the research methods used to accomplish them.

3.1 On-Site Research Objectives

The research divides naturally into three objectives: to determine the status of low VOC paint in the Australian paint industry, to identify explanations for their low sales, and to develop feasible educational campaigns and marketing strategies targeting potential consumers (paint contractors and retail consumers). These three research topics were explored using surveys and personal interviews. The objectives are detailed in the first section of this chapter, and the means to fulfil them are described in the second.

3.1.1 Status of Low VOC Paint in the Australian Paint Industry

The first objective of our project was to learn more about the history and role of low VOC paint in the Australian paint industry. Besides learning about the development and brands of low VOC paint products, we hoped to determine exactly who purchases paint, and, among

[2] Although the majority of our contacts were stationed in Melbourne and Sydney, the companies for which they spoke were national; thus, data gathered from them should be valid for all of Australia.

them, who already purchases low VOC paint. In addition, obtaining at least an approximation of the current volume of low VOC paint sales was crucial to our research.

The purpose of this research was to further define our project topic, and to more efficiently execute the methods used to fulfil the remainder of the objectives. Determining the product brands and the background of their release made us more knowledgeable of the product lines that we wished to promote. Specifying the major paint purchasers allowed us to target our research in the most effective manner. Finally, sales data provided a measure of the extent of the sales dearth, as well as a means to gauge the success of any future marketing or education.

Both of these major points of research were best obtained directly from paint manufacturing companies. In addition, interviews with paint distributors, wholesalers, and retailers proved helpful. The consumers themselves were able to provide assistance as well, through the individual paint contractor survey and the large contractor interviews. The methods used are discussed fully in their respective subsections of the On-Site Research Methods section.

3.1.2 Explanations for Low Sales

Once we determined the potential paint purchasers, we recorded their reasons for purchasing or not purchasing low VOC paint. Reasons investigated included quality and cost disparities, and issues with availability or knowledge of the paint; many of the questions posed to the subjects explored these topics. However, we allowed them to respond freely for a number of open-ended questions so as not to limit responses to only those explanations that we had previously hypothesized.

There were two purposes for the research meeting this objective. Primarily, an explanation for the low sales was a major deliverable for our project. The Australian manufacturers, environmental groups, and many other parts of the industry were all interested in this information. The secondary purpose of the results of this research was to provide a basis for the recommendations. Only by knowing the reasons for the lack of sales could we develop appropriate strategies for countering those reasons

This objective was met in much the same way as the first objective. The paint manufacturers and retailers provided what data they could – not definitive reasons for the lack of sales, but a general enumeration of the differences between the types of paint that could lead to a difference in sales. The consumers provided the definitive data in this research objective; the large contractors were able to share their reasons through interviews, and the individual paint contractors through questionnaires. The On-Site Research Methods section provides details about each of these methods.

3.1.3 Educational and Marketing Methods Concerning Low VOC Paints

Our third objective was to research educational methods and marketing approaches involved in educating consumers about VOCs, their dangers, and the benefits of low VOC paint. In addition to determining the target for our marketing or environmental education and the major informational points of this campaign, we sought a working knowledge of the methods that could communicate those points to that target audience. We needed to be aware of strategies used in the past and the level of their success, strategies used at the present and the level of their success, and other possible strategies that may not yet have been performed.

This research of existing approaches to environmental education and marketing and the consumer response to each was vital to the creation of new strategies that would be successful in increasing the sales of low VOC paints. By classifying features of both unsuccessful and successful existing methods for educating consumers about related topics and strategies in marketing other environmentally friendly products, we were able to recommended methods of education specific to low VOC paints.

While it might have been exciting to spend many hours watching Australian television (which had not proven to be very successful in terms of promoting low VOC paints) in the spirit of researching marketing tactics, our time was better spent interviewing representatives from manufacturers, retailers, and environmental awareness groups, as well as the customers themselves. We attempted to interview consultants from advertising firms, to incorporate their expertise in marketing and advertising. However, since it is the business of such firms to offer their advice for a fee, none was willing to discuss marketing strategies without charge.

3.2 On-Site Research Methods

Once in Australia, we contacted the sellers and the consumers of paints to learn more about the market and the paint. We gathered professional opinions on how to educate people and increase the sales of low VOC paints from a wide spectrum of people within the industry. The process of how information was gathered is described in the following sections, and the results are presented in Chapter 4.

3.2.1 Manufacturer Interviews

We contacted four companies that had produced low VOC paints at some point in time: Orica, Wattyl, Barloworld Coatings, and Galmet. Due to the location of our contacts, we conducted telephone interviews for all except the representative from Dulux, who we were able to visit to conduct a face-to-face interview. The interview was divided into two sections, technical and marketing, which allowed us to interview different company officials about their expertise, if a single person knowledgeable in both areas was unavailable.

The technical section of the interviews attempted to discover reasons for the poor sales of low VOC paints; we examined production costs and the market cost of the paint. Interviewing the manufacturers' technicians gave an excellent understanding of the composition of the different types of paint and the production cost differences among low VOC, water-based, and solvent-based paints. These interviews explored cost differences between low VOC paints and conventional water- and solvent-based paints, and differences in the functionality and quality of the paints. Appendix C contains the list of questions we asked the technical representatives of paint manufacturers in Australia.

In the marketing section, we held an in-depth conversation regarding the sales and the expected future market of low VOC paints. The main goal was to understand how the product was promoted and advertised, if there were any subsequent training programs for store staff, and the representative's personal opinion on how to increase the sales. Because we had found that companies might be reluctant to release precise information about sales, an approximate comparison between low VOC, water-based, and solvent-based paints sales was

obtained for analysis instead. Appendix C contains the list of questions we asked the sales representatives of paint manufacturers and retailers in Australia.

3.2.2 Interviews with Distributors, Wholesalers, and Retailers

Distributors, wholesalers, and retailers – the link between the manufacturers and the consumers – were valuable resources in our research. We collected the names of these businesses from directories, from manufacturers, and from others knowledgeable about the Australian paint industry. These "middlemen" were able to provide us with knowledge about their distinctive viewpoint of the industry, as they deal with both the manufacturers and directly with the consumers. The questions posed to the representatives of these companies are in Appendix J.

3.2.3 Individual Paint Contractor Survey

There are almost two thousand autonomous painters in the greater Melbourne area, and the best method we found to seek and attain their knowledge and personal opinions was to survey them. There are three ways to conduct a survey: face-to-face, via telephone, and self-administered surveys. Because of our limited group size and the number of people involved in the survey, face-to-face surveying was not practical. Although a telephone survey might have been possible, this method would also have taken more time than our project allowed. Thus, we selected a self-administered survey. We could have surveyed via postal mail, electronic mail (e-mail), or the Internet. We decided on postal mail for the simple reason that we could not locate e-mail addresses for the majority of the autonomous painters, and had no way to contact them electronically. A questionnaire (shown in Appendix A) was sent to each one of the selected painters (chosen as described in the following paragraph), accompanied

by a cover letter that explained the reason for the survey and an introductory letter from the Australian Paint Manufacturers' Federation. The questionnaire was to be self-administered and then returned to us in a prepaid envelope.

Before we sent out the questionnaire, we needed to obtain a list of painters in the area. For this list, we consulted the Australian yellow pages online (http://www.yellowpage.com.au). A simple Perl script was written to parse the approximate one hundred pages of painters to put their addresses into a database. Although some painters might have chosen not to publish their phone number in the yellow pages, the data we gathered were sufficient to serve as the sampling frame of the survey. Because we were mailing the questionnaires, it was financially impossible to survey the entire population of nearly two thousand; therefore, we randomly chose five hundred painters from this list as our sample. Starting arbitrarily at the twenty-eighth painter, we chose every eighth painter on the list (skipping the ones that had already been selected) until we had 500 painters to survey. A random number generator was used to generate our arbitrary values of twenty-eight and eight.

Since we had put return addresses on each of the pre-paid return envelopes, we were able to monitor which of the painters had replied, and were thus able to follow up with those painters who had particularly intriguing replies. Another benefit of this monitoring was our ability to telephone those painters who did not reply within ten days of our initial survey request. Due to financial reasons, we did not replace those painters whose questionnaire was returned because of a wrong address. However, we did call additional painters to compensate for the lost.

3.2.4 Large Contractor Interviews

Contractors were interviewed to ensure a more complete assessment of paint users. There were only two or three nationwide contractors; therefore, face-to-face or telephone interviews were the most effective way to gather the detailed information we needed. The contractors were asked the same questions (those from Appendix A) as the individual painters, since the desired information was similar for both groups.

3.2.5 Environmental Organisation Interviews

Since the information we sought was open-ended, we decided that a semi-structured interview would yield the most useful data. These interviews gathered knowledge about existing educational methods and the success of these methods, as well as expert advice about other educational means, which might be successful. A list of interview questions for the interviews with environmental organisation officials is in Appendix N.

The group of representatives from environmental organisations, such as the Environmental Protection Authority (EPA) and the Department of Environment and Heritage (DEH), was selected based on their experience with marketing – especially marketing environmentally friendly products – or based on their knowledge of low VOC paints. To find such experts, we compiled a list of names and titles of personnel in the organisations from the Internet, from the receptionists of major environmental organisations, from contacts referred by previous interviewees, and from contacts obtained from organisations such as the Department of Human Services (DHS). Once the list was completed, we selected one or two people from each organisation to interview. This gave us a number of people who were authoritative in the field of marketing or public environmental education.

3.3 Discussion on our Research Strategy

A case study such as ours requires many different research methods, which we performed in the hope that complementary results would be found by the methods we chose. As we completed the interviews and the survey, we found certain aspects of our case study process to be unique or at least unexpected. This section will consider those aspects.

3.3.1 Benefits of our Methodology

Studies, in order to be considered statistically significant, must incorporate randomness into their subject selection process; many studies will only be considered "valid" if they do this. However, for our project, randomness and statistical significance were not necessary. Much of our research was focused on gathering a wide variety of opinions for the simple purpose of gathering those opinions, not with the intentions of performing any quantitative statistical testing. Although we did use it out of convenience to select the sample for the paint contractor survey, we were not limited by the need for randomization, and thus we were able to continually seek out and tap new sources of information. This process actually prevented us from ignoring potentially significant resources, allowing for a more complete research project.

3.3.2 Limitations to our Methodology

Although an ideal project would have been able to find and consider all of those available resources associated with low VOC paint and its marketing, we faced a number of limitations in completing our research, despite the benefit provided by our partial randomization. The first two were the length of time allowed for completion, and our group size. The on-site

research of this project was finished in seven weeks, which was not enough time for our group of three to complete interviews with too many of the experts in the field, while leaving time to analyse the gathered data, draw conclusions, and actually develop our final recommendations. Second, representatives from manufacturers, marketing experts, and others whom we wished to interview were reluctant to devote time and energy to a project such as ours that might not benefit them. Gathering information from the smaller companies was especially difficult due to this reluctance. In many cases, our liaison, Kenneth Lofhelm or the Australian Paint Manufacturers' Association provided assistance in explaining the nature of our project to reassure our contacts of our intentions, and that their assistance would be very much appreciated.

Another limitation to be considered was the validity of our data. Since most of our data were collected from interviews, we needed to verify that the resource person being interviewed had a position in the manufacturing companies, environmental organisation, or retailer that allowed them to speak knowledgeably about the subject. In addition, companies wishing to protect their own interests may have been disinclined to release all of the information on the levels of VOC in their paints, their manufacturing costs, the success of their product lines, and any of the other information that we had sought. Triangulation was used in these situations to identify and sometimes resolve inconsistencies.

Chapter 4

Results and Analysis

Our research objectives were to determine the status of low VOC paint in the Australian paint industry, to identify explanations for its low sales, and to develop recommendations for feasible educational campaigns and marketing strategies targeting potential consumers. This chapter discusses the results obtained from the survey conducted of the individual paint contractors, as well as from the numerous interviews with personnel from paint manufacturers, paint distributors, large contractors, and environmental organisations.

4.1 Status of Low VOC Paint in the Australian Paint Industry

The first objective of our project was to investigate the Australian paint industry and the role of low VOC paint in it. Hence, information on the development and history of low VOC paints was investigated, along with their status in the industry. To assist in reaching our goal to develop a strategy to increase the sales of low VOC paints, we also identified the consumers of paints and their methods for determining which category of paint to buy.

4.1.1 History of Low VOC Paint Production

There are four paint manufacturers in Australia that produce or have produced low VOC paints: Orica, Wattyl, Barloworld Coatings, and Galmet. Orica is currently the owner of the well-known Dulux brand, as well as the second-tier Berger brand. Barloworld Coatings owns the Taubmans brand (under which the low VOC paint is sold), along with Bristol and White Knight. Galmet is a small to medium-sized specialized manufacturer of niche-market products (synonymous to the special purpose coating discussed in Section 2.4).

In 1994, the Dulux brand became the first to launch a line of low VOC paint in Australia, called *BreatheEasy*® (Keene, personal communication, 29 March 2004). Since Dulux was a brand of ICI Dulux Australia in 1994, its technicians worked in association with other ICI companies around the world, especially with those in the United Kingdom.

In the following year, 1995, Taubmans released a low VOC paint called *Living Proof Silk* ® (Allen Kesby, personal communication, 30 March 2004). However, the company was forced to take it off the market between 1998 and 1999 because of quality defects and market competition with Dulux's standard water-based paint, *Wash 'N' Wear 101*®. As Dulux was releasing a new product, Orica – the new name of parent company ICI Dulux – decided to withdraw *BreatheEasy*® as a Dulux line and re-introduce it under the Berger brand. Berger *BreatheEasy*® can still be found in hardware stores. Although the paint is available as a sealer undercoat in addition to as topcoat finishes including flat, low-sheen, and semi-gloss, many stores do not carry all of these varieties.

Wattyl's line of low VOC paint was first developed for the Olympic Games in 2000 (Rankin, personal communication, 23 March 2004). Called *CleanAir3* ®, it is available in both low-sheen wall and low-sheen ceiling types. Galmet, also currently has a specialized production line for producing low VOC paints (Ron Bill, personal communication, 18 March 2004). Unlike the low VOC paints of the three larger companies, those produced by Galmet make up most of the company's production, and they seem to be selling to a better-targeted market.

According to manufacturers, it costs more to produce low VOC paint than conventional water-based paint. Although they were reluctant to release any exact costs or prices, all of the manufacturers confirmed this comparison. When substances containing VOCs are

eliminated, substitutions must be made with other (usually more expensive) chemicals that have similar attributes. According to Allen Kesby (personal communication, 30 March 2004), Taubmans' method of avoiding this problem was interesting, but simple; when they produced *Living Proof Silk* ®, they took out the high-VOC components and used water as a replacement. According to several painters surveyed, the resulting product was watery and had poor coverage.

In addition, manufacturers encountered difficulties when adding colouring to low VOC paints. According to Ted Keene (personal communication, 29 March 2004), the Decorative Research and Development Manager at Dulux, tinters contain a high level of VOC. Conventional paints are produced with a certain white base (vivid, extra deep, and accent) and tints are added in the store to obtain the colour that the customer desires. Low VOC paints can go through the same in-store treatment to get a wide variety of colours; however, during this process, an additional 20 g/L of VOC is introduced to the paint. Adding VOCs somewhat defeats the purpose of having the low VOC value, even though the level of VOC is still significantly lower than conventional paints (70 g/L to 90 g/L before tinting). Faced with this issue, manufacturers produced paints in a limited range of colour to keep the paint below the 5-g/L level. (Low VOC paints are usually available only in pastel shades because the deeper and richer hues require more VOCs.)

4.1.2 Low VOC Paint Sales

Although manufacturers would not give any exact sales statistics, we were able to obtain approximations. According to Mr. Keene of Dulux, low VOC paints comprise less than one percent of the total architectural paint sales of Orica. John Rankin (Technical Manager of

Architectural and Decorative Paint at Wattyl) said that of ten million litres of Wattyl architectural paint sold annually, only 1000 litres (0.01%) are low VOC.

In contrast, Taubmans and Galmet seemed to have found a method to promote their sales of low VOC paints. Allen Kesby, Technical Manager of Taubmans, assured us that the sales of *Living Proof Silk* ® were acceptable to the company, about one million litres annually when the low VOC product was on the market. Ron Bill from Galmet claimed that 25% of its AUD$4 million annual income is from low VOC paints.

According to Wattyl and Dulux, the largest sale of low VOC paint was for the Sydney Olympics in 2000. The Olympic Organising committee mandated that only the most environmentally friendly products were to be used in the construction; thus 30% to 35% of the buildings were painted with low VOC paint.

4.1.3 Consumers

Manufacturers produce paints with slightly different formulas for the retail and trade markets; approximately 50% is for retail and 50% is for trade. The paints are distributed to local stores such as Bunnings, Paint Right, and company-owned stores such as Solver Paint, where both retail and trade consumers can purchase them. Julie Gallop (personal communication, 1 April 2004), the manager of a Solver Paint store and a former employee of many stores that Dulux supplied, confirmed that her customers were made up of both individuals and contractors.

Contractors buy paint in the trade line because it is less expensive. However, as Ms. Gallop revealed to us, although the contractors save money by spending less on paint, the quality of

the paint that they use is lower than that of the poorest paint from the retail line. Given this example of their behaviour, and their goal – to maximize profit – contractors seem less likely than others to buy low VOC paints because of the higher price. Of the contractors who replied to our survey[3], only 11% had purchased any of these low VOC products.

Individual consumers, however, are more likely to purchase the retail products for use in their own homes, because of a quality superior to trade products. A similar logic would predict that they would be more likely to purchase low VOC paint products, as they and their families would enjoy the health benefits. However, as we learned from retailers, low VOC paints are not popular among retail customers either. In the following section, we will consider possible reasons for this relative unpopularity in Australia.

4.2 Explanations for Low Sales

The second objective was to explain the poor sales of low VOC paints. Our research uncovered a variety of possible reasons for this: price differences, quality differences, lack of consumer awareness of the type of paint, and a lack of awareness or concern for the health and environmental hazards related to VOCs. We will discuss each of these possible reasons in the following section.

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[3] Of the 500 mailed questionnaire packets, we received 40 (8%) responses by mail and 4 (0.9%) additional responses by telephoning 18 non-respondents and requesting a telephone survey. The total response rate was 44 of 500, or 8.8%. The results of this survey can be found in Appendix B.

4.2.1 Price

Low VOC paint costs approximately 10% to 15% more to manufacture than conventional water- or solvent-based paints, a cost differential corroborated by all of the manufacturers interviewed. This higher production cost, due entirely to the cost of the paints' raw materials, leads to an increased market price. Although market price is influenced greatly by the demand on the market, manufacturers will put more effort into selling those products that give a greater profit margin and would be unlikely to make a product less profitable in order to put it in direct competition with another of their own products.

This capitalistic attitude is shared by many of the painting contractors we surveyed and interviewed. They also confessed that they are simply interested in turning a profit; although they have some concern for their own health as they are painting, this concern is not enough to overcome their aversion to the additional cost of using low VOC paint. All of the contractors who answered the question "does low VOC paint differ in price from conventional paint?" concurred that low VOC products are more expensive, with the differential given ranging from 20% to 85%.

A fact serving to further limit trade purchase of low VOC paint is that there is only one product available at a trade rate: Wattyl *CleanAir3*®. Berger *BreatheEasy*® is not available for trade; it can only be obtained at retail prices, which are almost double those of conventional trade paints.

The retail market in Australia, like the trade market, has a limited number of low VOC products available: only Berger *BreatheEasy*®. When *BreatheEasy*® was released in 1994 under the Dulux brand name, the price was approximately 15% higher than Dulux's standard

water-based paint. Interviews with a retailer who remembers this era recalls that low VOC paint was very expensive: "people would come and ask about it, but they would not buy it. I guess the price was too high" (Gallop, personal communication, 8 April 2004).

Since Orica is no longer selling *BreatheEasy*® under the Dulux brand, it is difficult to make a market price comparison between *BreatheEasy*® and conventional paint. Berger *BreatheEasy*® is the only retail Berger product that we found to be relatively widely available, so there is no standard to which its price can be compared. The obvious comparison is with Dulux's standard water-based paint (*Wash 'N' Wear 101*®); this has given mixed results. *BreatheEasy*® has been found in some stores to be more expensive and found in others to have a similar price to or lower than Dulux *Wash 'N' Wear 101*®. However, even if a clear retail price difference could have been attained, this comparison is complicated by differences in the public perception of the brands. Although both Berger and Dulux paints are produced by the parent company Orica, Dulux is a better-known brand, due to brand advertisements, word of mouth, and other supporting materials. Thus, consumers may believe that Dulux paints are better than Berger paints, even though the quality, in fact, may be the same.

4.2.2 Quality

Australian paint manufacturers are quite proud of the quality of their paints compared to the paints produced in other countries, an attitude with which they justify the use of the word "premium" in their paint lines. According to Neil Duggan (personal communication, 20 April 2004), Technical Manager of Architectural & Functional Coatings at Rohm & Haas – a company that provides raw material to most paint manufacturers – paint quality is the best in

Australia, followed by Europe, and then North America. These high standards in Australia for both trade and retail, imposed partially by APAS labelling, ensure the quality of any paints sold. Low VOC paints offered for sale in Australia are no exception. However, manufacturers have divulged the existence of a few problems associated with lowering the VOC content of the paint. When Taubmans *Living Proof Silk* ® was still a low VOC product, technicians had difficulty maintaining the block resistance[4] of the paint and in attaining satisfactory wet edge[5] while painting. These issues were actually the driving factor in Taubmans removing the product from the market and replacing it with a paint of more conventional VOC content. The manufacturers of *BreatheEasy*® and *CleanAir3*® claim that their paints do not suffer from the same quality deficiencies, and that the more expensive chemical components used ensure that quality is not compromised.

According to retailers, consumers look only for adequate coverage [6] and washability[7] in their paints, characteristics that low VOC paints do provide. None of the retailers we interviewed could recall any complaints from consumers about the quality of low VOC paint (although a

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[4]Block resistance is the ability to resist adhering to other materials: if paint has adequate block resistance, the paint, even before completely curing, will not cling to objects (such doorframes, windowsills, or clothing).

[5]Maintaining a wet edge (or open time) is important while painting; if the edge of a painted area dries before the brush or roller can be re-wet, the line of the edge will be difficult to blend. In addition, the brush or roller could damage the dried paint when contacting the surface.

[6] Coverage is the opacity of the paint after completely curing; ideally, nothing below the layer of paint will be visible.

[7] Washability (or stain resistance) is simply the ability of the paint to be washed without suffering damage.

lack of recollection is strongly influenced by low sales). However, retailers have commented on the limited range of colours available – a major drawback in the retail market. Because of the low demand and complications involved in the creation of low VOC tinters, the quantity of colours available for the low VOC line is limited. Even if the consumer chooses to permit a slightly increased VOC content by using regular tinters, only about a third of Dulux's colour range can be used, due to the restricted number of colour bases available.

Our contractor survey contained a question specifically inquiring about the quality of low VOC paints: "In your experience, are there any significant quality differences between ultra-low VOC paint and conventional water-based paint?" In their responses, three painters (of the twenty-one respondents who claimed familiarity with low VOC paint) had sensible qualms with the quality. One painter, who had actually purchased the product, named "durability" as being a problem in low VOC paint. The other two claimed that low VOC paints do not provide adequate coverage, but each of these also indicated that he had never purchased the paints; the information seemed to be second-hand. Many additional painters, although they could not name any specific quality concerns, did express that they were "not willing to risk the quality of [their] work", and choose to use conventional paints for that reason. To emphasize this concern, one of the responders to our survey wrote: "90% of our clients will take our word on the products but in turn we need security that the product holds up aesthetic qualities, as well as wear and tear: i.e. ease of application, sheen level consistency there of, colour fastness/range of colours, washability, cost." This uncertainty about quality is an issue that, to alleviate, would require manufacturers to take actions such as distributing samples to major contractors.

4.2.3 Consumer Product Awareness

Information about the consumer awareness of the product was obtained not only through our research, but also as a by-product of our research. When asking people about the paint, we were continually surprised by the people who had never heard of low VOC paint, even when the better-known terms "low-odour" or "low environmental impact" or even the names of specific paint products were given.

Figure 3 – Familiarity with and Purchasing of Low VOC Paint by Painting Contractors (n=44)

Many contractors, representatives from environmental organisations, and even paint retailers were found to be completely unaware of the existence of low VOC products. Only 52% of the surveyed painting contractors had heard of low VOC paint, and most noted that their clients had never asked for it. After receiving the information enclosed in our questionnaire, many of the contractors did express interest in finding out more about the paint, but only if they could evaluate it for little or no cost. The large contractors we interviewed were more likely to have heard of it, and even to have looked into its use.

Since a decade had passed from the time when a commercial was aired about any type of low VOC paint, the dearth of those familiar with it is understandable. However, in order to sell a

product, it is decidedly vitalthat consumers are aware of it; for that reason, awareness remains an issue that must be addressed.

4.2.4 Consumer Health and Environmental Awareness

As already mentioned, relatively few paint consumers were found to be aware of low VOC products; a similarly low proportion was aware of environmental or health concerns linked to VOCs. Forty-seven percent of surveyed contractors claimed to be aware of the health effects, while 43% claimed awareness of the environmental dangers. However, only 25% were actually concerned about those health effects and only 18% about the environmental effects. Finally, only 9% of the contractors have made changes (or plan to make changes) in their company in response to health concerns and only 9% to environmental concerns. Retailers have found similar attitudes in retail customers: few look at anything beyond cost, colour, and washability when purchasing paints.

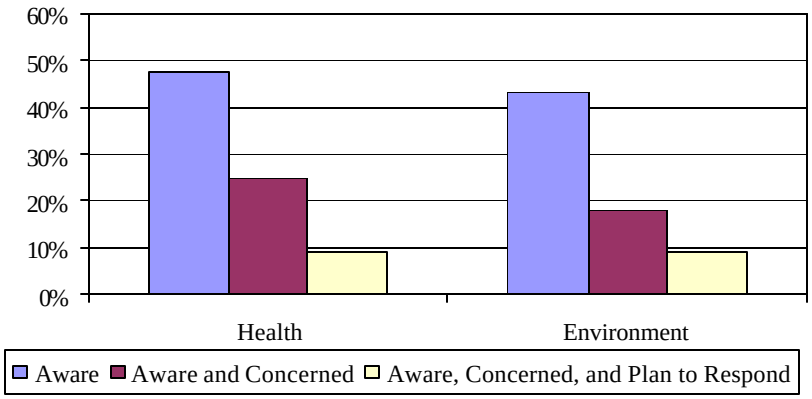

Figure 4 – Contractor's Awareness of Health and Environment Issues Related to VOCs (n=44)

However, Ms. Gallop believes that retail consumers' knowledge of the importance of protecting not only health but also the surrounding environment has been enhanced since

Dulux *BreatheEasy*® was first introduced. Their attitude, therefore, toward this environmentally friendly product is, in her opinion, different from what it was before. She also mentioned that there is a noticeable increase in the percentage of women purchasing paints. She said that women are "more likely to buy the [low VOC] paint because they want to protect their babies' health". Thus, if the commercials were to be re-launched, they would probably be more successful.

Consumers' concerns are increasing, especially regarding pollutants that damage the environment and their health. Thus, people, are more willing to protect their surroundings and health. However, their knowledge of damaging pollutants is still nominal and they must be informed that VOCs in paints are pollutants, about which they should be concerned.

4.3 Educational and Marketing Methods for Low VOC Paint

The final objective of our research was to determine the effectiveness of product marketing methods and health and environmental educational strategies that have been used in the past, are currently being used, and could be used in the future. We examined techniques used to promote the sales of low VOC paint and similar products, as well as those used to educate Australians about VOCs and their harmful effects. The relative successes of these strategies helped us to shape our recommendations for increasing the sales of low VOC paints.

4.3.1 Marketing Methods

When Dulux launched a low VOC paint for the first time in Australia, a television commercial advertised the existence and the environmental benefits of the paint (Keene, personal communication, 29 March 2004). Point-of-sale (POS) materials were also placed in

stores to supplement the advertising of the paint. However, the public did not respond positively to any of the publicity, and the company decided that the paint line was unable to support any additional advertisements. Ms. Gallop (personal communication, 8 April 2004) verified the existence of commercials produced by Dulux at the initial release of *BreatheEasy*®, and that there were brochures at the stores. She recalled that people would ask about the paint and sought more information, seeming interested. However, because of the price of the paint, few purchases were ever made. The advertisements were stoppedsoon after.

When Orica decided to release *BreatheEasy*® under their second-tier brand Berger, very few additional advertisements were created to promote the paint (Keene, personal communication, 29 March 2004). Today, there is no advertising at all for this product. However, within the company, sales associates were educated about it (as they learn about all new products) during daylong seminars at the "Orica Academy".

4.3.2 Environmental Education Methods

In order to make recommendations on educating the public about VOCs, we considered environmental educational campaigns that had been done recently. We interviewed Frank Mitchell, the Environmental Educational Coordinator from the Environmental Protection Authority in Melbourne, to learn about the different programs that the agency had offered. Most recently, they conducted an environmental campaign to warn dairy farmers about water runoff contaminated by animal wastes from their farms. The effects of polluted water runoffs were put into a brochure, along with what the long-term cost to the farmers would be if the problem went unfixed. The brochures were then distributed through the Farmers Association.

The program, according to Mr. Mitchell, had been successful in convincing the farmers to control the runoff.

When asked about the best method to educate Australians about the effects of low VOC paints, Mr. Mitchell said that it would depend on many factors. The first and foremost factor is the budget allocated for the educational campaign. What can be done is limited by the amount of money and resources available. The second factor is the target audience; establishing this will allow educational media distribution through organisations related to the target (e.g. the Farmers Association distributed the dairy farm campaign brochures). Finally, the content of the educational campaign is important. Different groups within our targeted audience (such as the trade and retail markets) may require different content, due to differing priorities in their purchasing.

Frank Mitchell suggested having the government mandate that paints with lower VOC levels cost less than paints with more VOC. There are precedents for this type of mandate in beer and other commercial products. He also said that POS material might help to promote the paint. Finally, Mr. Mitchell told us of every Australian citizen's duty to look after every other citizen's well-being; contractors and even paint sellers have a responsibility to inform their customers of what kind of paint is better for an individual's health and the environment. Such practices are called the *duty of care.*

Environment Australia is another organisation that has had much experience with promoting public awareness of the environment. According to Paul Kesby and Sue May, Director and Assistant Director of the Air Quality Section, respectively, recent educational campaigns included *Wood Smoke, Air Watch,* and *Smog Busters.* The media used for these ranged from

brochures, television, radio, and newspaper advertisements to seminars given by experts in Environment Australia. According to Mr. Kesby, most Australians do not know how much they contribute to air pollution, and it would be best if the content of an educational campaign were aimed at educating people about the health effects of VOCs. Focus groups with the targeted market could be useful in exploring how consumers would best learn, about the dangers products on the market in such a way that they would not doubt the credibility of the statements given by an environmental protection group.

Of all the types of media used by Environment Australia, Mr. Kesby recommended a brochure for our project, as people could read it while they are shopping in paint stores, or when they are meeting with a painter to discuss possible paints. A video requires potential consumers to be patient enough to remain in front of it for a certain amount of time, and traditional advertisements require a large budget.

Dr. Steven Brown (personal communication, 31 March 2004) is an expert on indoor air quality from the Commonwealth Scientific and Industrial Research Organisation (CSIRO). A significant VOC measurement discrepancy between scientists and the paint industry was discovered during our interview with him. Presently, the paint industry is measuring VOCs in grams per litre. However, as a scientist, Dr. Brown measures VOC emissions in terms of emission per unit area per unit time (grams/metre^2/second). In addition to this difference in measurement procedure, he maintains a more precise means of determining the actual health risk of products. A scientist must first identify the chemicals in the paint that have an effect on living organisms and then quantify the emission of these chemicals. Dr. Brown has conducted tests on several paints advertised as "low VOC" based on their VOC content, but he did not find that all had the low emissions and the lowered health risks to support the

healthy implication of their "low VOC" label. However, he did admit that if the VOC level of a certain type of paint were significantly lowered, the emission rate (and most likely the health risks) would be reduced as well.

According to Mr. Lofhelm (personal communication, 6 April 2004), even though SSL and AGAL are scientific laboratories, VOC emissions measured by these laboratories are in grams per litre. The methods they use to measure VOC emissions are the same as described by U.S. EPA. This method assumes that 100% of VOC in the paint is emitted into the ambient air. Thus, providing the amount of VOCs in a litre of paint will also be providing the amount of total VOC emitted.

Dr. Brown feels that the best way to promote low VOC paint is through a new labelling scheme. The Australian Environmental Labelling Association (AELA), although established very recently, has installed a labelling scheme for environmentally friendly products. Ms. Gallop (personal communication, 8 April 2004), however, said that consumers normally do not check for any labelling when they are shopping for paint. Generally, they will not even read the instructions themselves; consumers will ask the sales representatives about the performance and about the range of colours available, and the sales representatives will usually suggest any necessary special methods for applying the paint. However, the print on the can is usually too small to read easily, the information on the can is not necessarily comprehensive (even for warning labels), and many of the symbols used on the label mean very little to retail consumers.

Finally, Dr. Brown also suggested a study on the general health of people. If a person's health requires the use of such a product, the consumer may be more willing to pay a higher

price for it. As an example, Dr. Brown said that the population with asthma and related health problems may be as high as 20% of the Australian population – they would be more likely to buy this type of paint for health reasons.

4.4 Summary

In this chapter, we established the role that low VOC paint has in the Australian paint industry, along with explanations for its low sales. Although low VOC paint was developed and first sold a decade ago, the Australian public does not generally know of its existence. A few contractors and painters have heard about it, but few have chosen to use it, due to the higher price and perceived quality issues of the paint. Furthermore, those knowledgeable about the existence of the paint are often unaware of the advantages the paint offers.

To aid our development of a strategy to promote the awareness of the existence of the paint and its benefits, we collected information from environmental organisations. Representatives from these organisations discussed numerous types of media that can be used to educate the public and promote low VOC paints. A brochure was the most common promotional medium mentioned and is advantageous due to its ease of distribution and low cost of production. The brochure should emphasise health effects of VOCs, because many Australians are unaware of their contribution to environmental hazards and would more likely be convinced to use low VOC paints if they knew their health were at risk.

Chapter 5

Conclusion and Recommendations

In this chapter, we present the conclusions – explanations for the poor sales of low VOC paint – that we reached after our data collection and analysis, along with recommendations for manufacturers, environmental organisations, and government officials in order to improve the sales of low VOC paint. Although currently there is no single sponsoring agency that will ensure the recommendations be carried out, we are optimistic that the industry and health organisations will want to follow up on what we have found in order to promote the in paint sales and improve the health and environment of Australia.

5.1 Conclusions

The class of VOCs, one of the most common air pollutants, is a category of chemicals that contribute to the creation of ground level ozone, a substance that is very harmful to health. A major source of VOCs is architectural paints. Limiting the levels of these volatile compounds in this category of paint can result in less polluted indoor and outdoor air and lead to a healthier life for all.

To facilitate the achievement of this goal, paint manufacturers have produced low VOC paint, which is classified in the water-based paint category of architectural paints. The VOC content in low VOC paints is less than or equal to 5 g/L, which, compared to conventional water-based paint levels varying from 70 g/L to 110 g/L, is remarkably low.

Promoted as a "low environmental impact" or "low odour" product, low VOC paint is a superior choice over conventional paints for application on interior surfaces. This is because of decreased health risks such as irritation to the eyes and skin, dizziness, asthma attacks and even cancer, which, according to studies conducted by the U.S. EPA, are all conditions that can be caused by exposure to VOCs. Studies have also shown that VOCs are not only the major component of ground level ozone (smog), but also soil contaminants if paint is disposed of improperly. Although low VOC paint could be an invaluable component to a solution to these problems, its sales are not currently significant enough in Australia to make an impact. According to Mr. Lofhelm, the executive officer of APAS, who is actively involved in lowering the levels of VOCs in all water-based paints, the poor sales of low VOC paint are disappointing for the industry and unhealthy for the public.

The goal of our project was to determine the major causes behind the lack of sales of low VOC paint and to present recommendations that, if implemented, would increase those sales. To evaluate the extent of the sales problem, we gathered sales statistics from paint manufacturers and surveyed painters regarding their paint purchasing habits. We found, as expected, very low sales for the major brands of low VOC paint. To explain these low sales, we interviewed manufacturers and large contractors and surveyed painters, asking each about the differences they find between low VOC and conventional paints.

We discovered several factors that explain the poor sales. First, there is the lack of consumer knowledge about low VOC paints. Many potential consumers have never heard about low VOC paints, and many who have remain unaware of the benefits of its use. The brief advertising campaign for one brand was conducted too early, before people became aware of the detrimental effect of air pollution on their health.

Large contractors and painters have complained of quality differences between low VOC paints and conventional paints, despite manufacturers' claims to the contrary. Negative experiences with low VOC paints may have prejudiced some of them against the product class, leading them to presume that the current products on the market also have compromised quality; some consumers have the impression that low VOC paints have poor coverage and are not as durable as other conventional paints. Many contractors do not want to jeopardize the quality of their work and lose clients; consequently, they seldom use low VOC paint.

In addition, low VOC paint often costs more than conventional paints, especially for contractors who normally purchase relatively inexpensive trade paints. This cost differential, combined with the bias against low VOC paint quality, is a leading cause for the low sales. Contractors have said that if their clients do not specifically request it, they will not purchase or suggest a more expensive paint.

Retail consumers are also concerned with the quality of the paints they purchase, although they base their judgment less often on their own experience with paints and more upon the brand name of the paint that they are considering. Although low VOC paints are sometimes less expensive than premium retail products, consumers are more likely to purchase the premium retail products because of their brand names. Certain brand names often have more advertising and a wider availability than other brands.

In the retail market, the limited colour range in which low VOC paints are available also contributes to their poor sales. There is a limited range of tinters that can currently be produced without VOCs. Even if a consumer decides to use conventional in-store tinters

(which add approximately 20 g/L of VOCs into the paint), only one third of the full colour range is available, due to the lack of available paint bases.

The final part of our research consisted of interviewing representatives from environmental organisations in order to evaluate where improvements or changes could be made in the current system for public environmental education, specifically about the dangers of VOCs and the contrasting benefits of low VOC paint. This allowed us to make recommendations, which should help consumers make better-educated decisions when purchasing paints, and aid manufacturers when producing and advertising low VOC paint.

5.2 Recommendations

The second part of our goal was to develop recommendations based on our research, in order to counter the causes for the poor sales of low VOC paint. The following recommendations are divided into five sections, each listing different actions that can be taken by environmental agencies, manufacturers, or the government in order to promote the awareness of and increase the sales of low VOC paint.

5.2.1 Manufacturer Research and Development

1. Definitive research should be done to compare the qualities of low VOC paints with conventional paints, and any defects should be addressed. No promotion of the product can be successful until this step has been taken.

2. Research should be done to lower the production costs of low VOC paints.

3. Manufacturers should continue to meet and exceed APAS labelling regulations.

5.2.2 Environmental Brochure

1. A brochure (similar to the prototype in Appendix Q) should be produced, detailing both the environmental and health concerns of VOC emissions.

2. This brochure should target various groups of green consumers, such as those interested in protecting their pets ("Animal Lovers") or the planet ("Planet Passionates"). According to J. Ottman Consulting, Inc. (2003), green consumers are divided into different "shades" of green; the deeper the shade, the more they are concerned with the environment. By targeting the priorities of each of these subgroups, we can best appeal to all environmentalists.

3. The brochure should emphasize health effects, as more people are concerned about these than about the environmental effects of VOC emissions. The health section of the brochure should especially appeal to pregnant women and parents with newborns or young children.

4. The brochure should encourage the use of "low VOC paints", but should not mention any specific brands or products.

5. The brochure should be sanctioned by environmental and health organisations such as the EPA, DEH, Environment Victoria, and the Asthma Association.

6. The brochure should be made available at offices of environmental and health organisations, at industry organisations such as the APMF, in hospitals and care centres, as well as in stores where low VOC paints are sold.

5.2.3 Manufacturer Promotions

1. The manufacturers should create separate brochures describing the benefits of each of their low VOC paints, specifically for promoting them to contractors and in retail stores. These brochures should be more appropriate as POS material than for distribution through environmental organisations. Furthermore, these contractors should be able to promote the paint by passing them on to their clients.

2. A video should be made, intended to run continuously in stores. This video would discuss VOCs, the dangers of VOCs, and how low VOC paints can reduce those dangers.

3. Newspaper and radio ads should be created to supplement the brochures and videos.

4. As the sales increase and the low VOC paint lines can support more advertising, television commercials and billboards should be used to reinforce the campaign.

5. Samples of low VOC paints should be given to contractors, in order to demonstrate the immediate benefits of the paint, and to show that their quality is comparable to that of conventional paints. These samples, accompanied by brochures and documentation, initially should be offered free-of-charge to the contractors and could be given in conjunction with training sessions or demonstrations.

6. Home building/home improvement television shows (such as "The Hot House") should be approached to use low VOC paint product and promote its benefits.

5.2.4 Government Initiatives

1. APAS should continue to lower the acceptable levels of VOC in paint. However, the levels of VOCs should also be lowered for solvent-based paints and only at a rate that will allow the industry to respond without compromising the quality. In addition, the APAS auditing system should be evaluated.

2. The government should insist that painting jobs done for government buildings, hospitals, schools, and other public buildings use only low VOC paints.

3. The state governments should pass regulations on pricing regarding the amount of VOC in a can of paint. Paints with a lower VOC content should be less expensive than paints with higher VOC content. This price structure could be created through a tax, or through direct price control.

4. The government should target individual point sources of VOCs (such as paint manufacturing facilities) to reduce the amount of VOCs released.

5. If these regulations are successful in Victoria, proposals should be sent to other states for review and implementation.

5.2.5 Possible Future Investigations

1. Funding options, as well as a completion timeline, for our recommendations should be investigated and implemented.

2. Research should be done to compare paints worldwide, to determine the reason for the different qualities of paints and an explanation of the higher production cost in Australia.

3. Research should be done to investigate the formation of the public's paint buying habits, specifically studying the acceptance of water-based paints as a replacement for solvent-based paints, and using this analogy to encourage the adoption of low VOC paint.

4. Focus groups should be conducted to investigate which method of education and promotion are most preferred by paint consumers, involving contractors, retail consumers, and government officials, and being sure to include prominent ethnic groups.

5.3 Summary

Although the sales of low VOC paint are weak at present, there is still a desire for low VOC paints from environmentalists and the government. A major reason for the low sales is lack of knowledge. Our recommendations, if implemented, should increase the public's awareness of low VOC paints, as well as the knowledge of their benefits to the environment and health of individuals. The other major issues, those of price and quality, can also be addressed. Many manufacturers have said that if there is a greater demand for the paint, more research can be done to further improve the quality of the paint and decrease the cost of production. We strongly believe that the implementation of our recommendations by the appropriate organisations will resolve each of the issues mentioned above and increase the sales of low VOC paints in Australia. With improved sales, low VOC paint may replace some types of paint on the Australian market, and help alleviate many of the health and environmental concerns of VOC emissions.

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Appendix A – Survey Cover Letters and Questionnaire

Low VOC Paint Research Team
50 Boundary St.
South Melbourne, VIC 3205

To Whom It May Concern:

We are a group of students from Worcester Polytechnic Institute in the United States working on a university project to analyse some aspects of the paint industry in Australia. As your company represents an integral part of the paint industry, we are hoping that you will be able to provide us with the invaluable information necessary to advance our research.

Volatile organic compounds (VOCs) have been a component in paint for much of its history. Recently, manufacturers have developed products that contain far fewer VOCs (less than 5 grams per litre) than conventional solvent-based or water-based product. These "ultra-low VOC paints", also known as "low odour" or "low environmental-impact" paints, have been found to be better for the health of those coming in contact with the paint, and also for the environment.

However, it has been found that there is a lack of interest in using these environmentally friendly paints. Your insight would be quite helpful in determining the reasons behind this problem, and possible methods of solving it. We would appreciate if you would be willing to take a few minutes to fill out the questionnaire enclosed and send it back to us, using the enclosed envelope, as soon as possible. Thank you!

Sincerely,

Fotjana Bida

Ryan Carey

Kyna Hu

Australian Paint Manufacturers' Federation Inc.

Suite 1201,
Level 12,
275 Alfred Street
North Sydney N.S.W. 2060

Tel: 61 2 9922 3955

Fax: 61 2 9929 9743

Executive Director: M.H. R. Hambrook

23 March 2004

File: B24

To whom it may Concern,

This is to introduce the following students from Worcester Polytechnic Institute Worcester MA, USA. These students are currently in Australia undertaking a study into the public's take up of low VOC/low odour decorative paints.

Fotjana Bida
Ryan Carey
Kyna Hu

The APMF is pleased to be associated with Worcester Polytechnic in this exercise and hopes that its members and any other parties approached by the students for assistance in their study will provide such assistance to the extent that they are able.

For further information regarding this study please feel free to contact the APMF or Ken Lofhelm Executive Office, Australian Paint Approval Scheme 03 9248 4900.

Yours sincerely
AUSTRALIAN PAINT MANUFACTURERS' FEDERATION

Michael Hambrook

Michael H. R. Hambrook
EXECUTIVE DIRECTOR

file:corr/letters/ Worcester Polytechnic Institute

Questionnaire

(Please write directly on this form, and feel free to use the reverse for additional space)

1. Had you ever heard of ultra-low VOC paint prior to this contact?
   a. Yes b. No

2. Have you ever purchased ultra-low VOC paint for yourself, or for a client?
   a. Yes b. No c. I don't know.
   If Yes, what brands and types of paint, and what was the outcome? If No, why not?

3. Of all paint that you purchase, how much of it is ultra-low VOC paint? (by volume)
   a. None b. Between 0% and 20% c. Between 20% and 40%
   d. Between 40% and 60% e. Between 60% and 80% f. Between 80% and 100%

4. Are you aware of the existence of *health* concerns associated with the use of conventional (higher VOC) paint? (Answering "Yes" doesn't require specific knowledge of them.)
   a. Yes b. No
   Please list any that you know:

   If Yes, are they of concern to your company or to your clients? Do you have plans to address these issues?

5. Are you aware of the existence of *environmental* concerns associated with the use of conventional (higher VOC) paint? (Answering "Yes" doesn't require specific knowledge of them.)
   a. Yes b. No
   Please list any that you know:

   If Yes, are they of concern to your company or to your clients? Do you have plans to address these issues?

6. In your experience, are there any significant quality differences between ultra-low VOC paint and conventional water-based paint? Please describe any differences:

7. In your experience, does ultra-low VOC paint differ in price from conventional paint?
   a. Ultra-low VOC paint is more expensive.
   b. There is no difference.
   c. Conventional water-based paint is more expensive.
   If there is a price difference, please give the approximate value of the difference.

   Does the price difference prevent you from purchasing the more expensive paint? At what price range would you consider using it?

8. What value to your organization would the following have?
   a. Specific "ultra-low VOC" training from manufacturers

   b. Government regulations requiring the use of ultra-low VOC paints for specific jobs

9. Are you aware of any negative aspects of ultra-low VOC paint?

Appendix B – Survey Responses

The survey data following is the data transcribed, as accurately as possible, from the questionnaires submitted by painting contractors.

Each column represents the responses to a question from the questionnaire shown in Appendix A.

Painter	Questions									
	1	2	3	4	5	6*	7	8a	8b	9
1	yes	no	none	yes – I believe paint dryers affect the nervous system and dulls the sensitivity of nasal passage etc. – yes we are concern but no we don't plan on addressing them	yes – I expect that they affect the ozone layer. yes we are concerned, but basically, cost limits our ability to address this issue	don't know	don't know			
2	yes	no	none	No	yes – water pollution	don't know	A		we don't do much gov work	
3	yes	not sure	none	yes – I am a bit concerned about long term effects	no			have value		
4	yes	no	none	yes – no concern – don't plan on addressing issues	no	none	A - $15 more - yes	none	none	no
5	yes	yes	0%-20%	yes – we are concern – and plan to address these issues	yes – difficult to dispose of – concerned – plan to address issue	new technology in developing low VOC solvents use	A – within 15%-20% difference	tried by manufacturers	yes	lack of coverage per metre square
6	yes	no	none	yes – asthma and allergies – no concerns – don't plan on addressing issues	no	have not compared them	A – don't know – only if client requests – within 10%	More know-ledge, more recommenda-tion to clients		limited available range
7	yes	not sure	0%-20%	yes – no concerns – don't plan on addressing issues	yes	durability	A – 50% difference – price prevents use			durability, skill (ease) in application
8	yes	no	none	No	no	solvent-based are hard wearing, water-based easier to work with and clean	A – I am not interested to learn more about this paint			
9	yes	not sure	0%-20%	No	no	coverage	A - $10-$15 more – prevents use – would use at trade price	none	none	no
10	yes	no	none	yes – painters syndrome, asthma, infertility, brain damage – concerned – by being as safety conscious as possible	yes – address issue by responsible disposal of waste products	yes, low VOC paints does not have as good coverage, not as washable, more expensive, and restricted colour choice	A – clients are not as prepare to pay higher prices		more competitive price and better education for the public	

* A: Ultra-low VOC paint is more expensive; B: There is no difference; C: Conventional water-based paint is more expensive

	1	2	3	4	5	6*	7	8a	8b	9
11	yes	yes	0%-20%	no – generally of clients concern, asthma sufferers	yes – no plans to address normal house paints	you have to get used to products and discover abilities	A – approximately $5 more per litre – bring back to trade rates	would help to know the product	no value, keep gov out as long as possible	no
12	yes	yes	0%-20%	yes – breathing difficulty, eye discomfort, skin irritation & problems – is sometimes concerned – plan to issue if a better product can be manufactured	yes – odour in atmosphere – sometimes, smell & breathing difficulties with oil based enamels	not sure	A - $10 more per 4 litre can of paint – price prevents use of paint – need to be in regular paint range	better aware-ness & know-ledge giving greater con-fidence to use VOC paints	no added value in domestic jobs, could aid work in hospitals	quality of finished product on a surface
13	yes	no	none	yes – not good for people with respiratory problems – clients never requested it	yes – clients have never requested the paint	have not used	don't know – price does not prevent from use	good value		no
14	yes	no	none	yes – asthma, blocking of nasal passage, skin irritation – concerned – need same finish quality to use	yes – soil contamination – would like to address issue	no. have not been approached with samples to try. Not willing to risk the quality of my work	A – not sure, but thinks ultra-low VOC paint is more – price does not prevent from use if quality is good	very important to educate people	it would be good	not at the moment, I would have to use it first
15	yes	yes	none	yes – some types of cancer – not really, no plans to change work habits	no	no, low VOC paint has the same qualities as standard paints	A – 10 litres trade price standard paint is $60 and low VOC is $110 – makes job to expensive, no use	none	none, unless working those specific types of jobs	only the high price
16	yes	no		yes – not concerned – no plans to address issue	yes – disposing of leftover paints – no concern – no plan to address issue	Have heard that low VOC paints do not have the coverage required and are to expensive	A	good		
17	yes	not sure	0%-20%	No	no	No	have not bought any to compare	could talk to clients about differences	depends on what they are & where	no but any information would be interesting
18	yes	no	none	yes – penetrating into skin/regular rinsing skin, eye – no concerns	yes – getting in water catchments and require thorough cleaning – clean up using drop sheets – no concerns	acrylic much easier to collect dust residue than harder solvent based	none	good		

* A: Ultra-low VOC paint is more expensive; B: There is no difference; C: Conventional water-based paint is more expensive

	1	2	3	4	5	6*	7	8a	8b	9
19	yes	no	none	yes – only a partial knowledge regarding solvent vapours of enamels etc, not sure of long term effects but would like to know - concerned	no – but would like to know	have never used ultra-low VOC paint, but would be happy to test if samples are provided	A – low VOC paint costs 20% more – client would prefer conventional paints if price, quality and availability is the same	2/10	10/10	cost, availability, and quality
20	yes	no	none	yes – asthma, nausea, vomiting, a "high" – no concerns – no plan to address issue	yes – only with disposal of them	don't know	no idea	would be good	good idea	
21	yes	yes	0%-20%	No	no	No		great	in favour	no
22	yes	no	none	Yes	yes	have not used				
23	yes	no	none	yes – full breathing, mask-Airfed/fume extraction – planned to address issue	yes – planned to address issue		A			
24	no	no	none	no	no	water-based paint is safer, cleaner, and less odour	B	none	none	no
25	no	no	none	no				none	n/a	no
26	no	no	none	no	no	Never used		none	not to my knowledge	same
27	no	no	none	yes – concerned – plan to address issue only if available	yes – concerned – plan to address issue	n/a		interested	ok, quality considered	no
28	no	no	none	yes – cancer – not sure if concerned – not sure if there is plans to address issue	yes – waste disposal e.g. turps – concerned – plan to address issue	don't know		who sells the product		no
29	no	no	none	yes – concerned – no plans to address issue	yes	low VOC is pretty well unheard of	don't know			
30	no	not sure	none	no	no	too much water	price prevents from using			no
31	no	no	none	no	no	don't know	don't know – price is a factor for not use	would be interested	will follow if made known	no
32	no	no	none	no	no					no
33	no	no	none	yes – concerned, if there is more information to advise clients – no plan because no clients ask for it	no	have not used		(chose this method)		

* A: Ultra-low VOC paint is more expensive; B: There is no difference; C: Conventional water-based paint is more expensive

	1	2	3	4	5	6*	7	8a	8b	9
34	no	no		no	no					
35	no	no	none	yes – concerned – would like to address issue	yes - concerned	not up to date with any low VOC paints at this stage	A – not up to date with costs	good	would work on gov. jobs	
36	no	no	none	no	no			circled this method		
37	no	no	none	no	no	don't know	don't know		(check this method)	no
38	no	not sure	none	no	no					no
39	no	no	none	no	yes	don't know		yes	definitely no	no
40	no	no	none	no	no		don't know			no
41	no	no	none	no – don't plan on addressing issue	no – don't plan on addressing issue	don't know	don't know	no value	no value	don't know
42	no	not sure	none	no	no				(circled this method)	
43	no	no	none	no	no	no				
44	no	no	none	no	no	never heard of them	not aware of any paint shop that sells low VOC paints			no

* A: Ultra-low VOC paint is more expensive; B: There is no difference; C: Conventional water-based paint is more expensive

Appendix C – Manufacturer Interview Questions

Technical

1. Are you able to share information about sales statistics of paints with us? Approximately how much ultra low VOC paint do you sell monthly?

2. What kinds of paints does your company produce? How do you distribute them?

3. If the cost of Raw Material Component (RMC) of "normal" water-based paint is one, what is the cost of RMC of ultra low VOC? What is the cost of solvent-based paint?

4. How many products that you produce are ultra low VOC? Will this range increase?

5. Do contractors ask for information about more environmentally friendly paints (concerning occupational health), like the low VOC? Do they then purchase it?

Marketing

1. How have you marketed your ultra low VOC products in the past?

2. Is the sales high enough to keep the paint on the market? If not, how much more do you need to sell in order for it to be profitable? What is the paint's future in your company?

3. If sales of ultra low VOC paints are low, why do you think this is the case? How would you suggest going about increasing the sales of ultra low VOC paint?

4. Is there any staff training to help sell ultra low VOC paints, either from the store or from the manufacturer?

5. What is needed to make your ultra low VOC paint successful on the market?

Appendix D – Manufacturer Interview: Sherwin-Williams

Date: 16 February 2004
Time: 11:00 -11:45 am
Location: Worcester Polytechnic Institute, telephone
Interviewee:

Mark T. Weiner, Sherwin-Williams

Interviewers:

Fotjana Bida, secretary
Ryan Carey, assistant secretary
Kyna Hu, spokesperson

(First, we each greeted Mr. Weiner, and then familiarized him with the project.)

Hu: Does your company produce low VOC paints?

Weiner: Yes, most of our water-based products have low VOC percentage. There was a Massachusetts law passed, I think on October 5, 1995, which said that all paints manufactured after that date could not be without the "VOC Compliance" label, which limits the VOC content.

Hu: What levels define low VOC?

Weiner: I don't know, but I think it varies from state to state. We have a solvent-based paint labelled as low VOC with 426 g/L, so for solvent-based, it's at least that level. For water-based paints, the acceptable level is approximately 0 g/L.

Hu: How much VOC does each gallon of your low VOC paint emit?

Weiner: It emits 0 g/L of VOC. Bu not all of our company's water-born products are that low. They are typically around 187 g/L VOC.

Hu: Can you give us some sales statistics for low VOC paint? Is it popular?

Weiner: I can't really discuss sales statistics, but I can say that our low VOC products are very popular. We market it mostly to schools and hospitals; for example, we have a university that wants to paint the dorms during school season. This

school will look for our low VOC products because there is virtually no odour. Another example of the usage of low VOC paints is in hospitals, and more specifically in maternities in Rhode Island. If they need to paint the next room, they will ask for our low odour, low VOC paints, because they don't want to disturb the patients.

Hu: Do you have any marketing or educational campaigns to promote low VOC paints?

Weiner: There is national advertising, and of course, promotion through architects; usually people receive the low VOC paints very well.

Hu: Are you aware of the health or environmental concerns?

Weiner: To tell you the truth, I know there are health concerns related to the usage of high VOC products, but I don't know any in particular. I am actually an architect; the chemists of the company are in charge and know about any concerns better than I know. But I am sure that if there are any issues related to VOC, the company will specify those on the labels.

Hu: Are there any quality differences between low and high VOC paints?

Weiner: Low VOC paints are easy to clean (just water and soap), they do not release fumes in the air, and they have low odour. I will send more information through the fax.

Hu: Who are the major consumers of low VOC paint?

Weiner: We usually sell our products in the Boston area and Rhode Island area.

(We explained the project in more detail, describing the Australian lack of sales.)

Hu: As an expert in marketing low VOC paints, can you think of reasons why people would not buy low VOC paints?

Weiner: That's really quite interesting. I guess it's different in Australia, but at least here, as I said before, low VOC products are the hottest thing in the paint

industry here. There is no price and quality difference from the rest of the paints, and there's no odour.

Hu: Well, in Australia, there is actually a [AUD]$10.00 price difference per gallon; low VOC paints are more expensive than conventional paints.

Weiner: Then that's probably the cause of the lack of sales.

Hu: Our goal is to educate about and promote low VOC paints. Do you have any marking strategy that we could use when we are there?

Weiner: If I were in your place, I would find out who is the "key person" that is making the decisions for each large project, and prepare a power point presentation where you can mention all the advantages/benefits of using low VOC paints. Also, in the beginning of presentation open about five cans of low VOC paints without telling anybody. After you are done presenting, reveal the presence of the cans, and the absence of any odour. That's what we do.

Hu: That is a nice strategy. We will keep it in mind. Thank you for your time, Mr. Weiner.

Weiner: You are welcome! If you need additional information, feel free to contact me again. This sounds like an interesting project and I would like to help more. We can even schedule an interview on campus, if you guys are interested.

Hu: Thanks, we'll be in touch then. Thank you again, and have a nice day!

Weiner: Good Luck!

Appendix E – Manufacturer Interview: Dulux

Date: 29 March 2004
Time: 9:00 – 10:30 am
Location: Dulux Research Laboratories, Clayton, Victoria
Interviewee:

Ted Keene, Decorative Research & Development Manager, Dulux

Interviewers:

Fotjana Bida
Ryan Carey
Kyna Hu, secretary

(The day of our interview was awful, rainy, and windy. The lack of umbrellas did not make our walk from the train station to the Dulux centre any easier or more pleasant).

Keene: I am sorry that we don't have towels for you to dry off a bit, but would you like some coffee or anything?

Group: No, but thank you.

Keene: No worries. Would you like me to start with our company information and some background information about low VOC paint?

Group: Sure, we'd love to hear about your company.

Keene: Dulux used to be part of ICI. We first launched a low VOC paint in 1994 called BreatheEasy, as a similar product was launched in London. We worked with people in Europe to lower the levels of VOCs in paint, and whe n they launched the paint into the market in Europe, we launched it as well. When we first launched it, we were thinking that it is good for the environment and that people were beginning to be more "green" friendly. Here is a copy of the label on the paint can when it first came out. As you can see, it has the river and trees to promote the environmental aspect of it, but it didn't do well in the market. The label also explained what volatile organic compounds are and had a figure comparing the percentage of VOC in each category of paint (solvent, water-based, and low VOC). It was advertised as "environmentally friendly," "No fumes, No solvent." We withdrew the paint from the market in 1998.

We made slight changes to the formula and re-launched it under our lower end line of paint Berger in 1998. This time we targeted the health aspect of the paint. We had a group of students from Monash University to do a study for us and in addition to their results, we received an endorsement from the Asthma Association saying that the paint causes less irritation and is likely to trigger less asthma attacks. We put a picture of a baby on the paint can to try to suggest that it is good for children, but the sales are still minimal.

Group: What do you think is the reason why people are not buying the paint, when it offers so many benefits?

Keene: Well, there are limitations to the paint. There are about 60 mL/L of VOC from tinting in a can with vivid white as the base colour, which is about 1/3 or approximately 20 g of VOC. When you add tint or colours to the paint, the VOC content goes up. Zero-VOC tinter dries out very fast. So, as manufacturers we face many difficulties. We have factory-packaged colours for people, but they are very light colours and usually pastel. If people want to, they can use the tinter at stores, which will add some VOC to the paint.

Also the stain and scrub resistance factor is important to Australians. Because of the way the molecules are arranged in the raw material of the paint and the way it dries, low VOC paint is considered a softer paint than other conventional paints. However, these issues have been researched, and the paint we have today has a perfectly acceptable quality level.

Group: How much VOC does a regular can of paint have?

Keene: A regular can of water-based paint has about 70g - 90 g of VOC in it. The best paint in Australia, Dulux Wash 'N' Wear 101, has about 84 g of VOC.

Group: Is there a price differences between low VOC paints and water-based paints?

Keene: Yes. We need different resins to make low VOC paints; chemical companies like Rohm & HAAS charge us 15% more for what we use in our low VOC paints. So the price difference on the market is about 15%. I think a four litre can of Wash and Wear in a store like Bunnings is about AUD $55, and a can of BreatheEasy is probably around AUD $70 or so.

Group: We understand that trade gets a lower price than retail, what is the price for trade?

Keene: Well, we don't sell BreatheEasy as a trade product, although it is available at trade outlets so professional painters can purchase it. The sale of the product is not significant enough for us to put more research into it to make it a trade material. But I think the trade price for water-based latex paint is about AUD $35 a litre.

Group: Are there any quality differences?

Keene: Not many. However, as I have said, the paint is not as good as Wash 'N' Wear 101 as far as washability goes. There are very few quality differences, but, for example, I re-painted my house recently, and I used Wash'N'Wear101 because I know it is a slightly better paint.

Group: What is your own personal opinion on how to increase the sales of this paint?

Keene: Well, I personally would like to increase the sales of the paint very much.

Group: How do you suggest we do it?

Keene: Well, we had a TV commercial advertising Dulux BreatheEasy, which cost about half a million dollars. However, since the sales were not good, we decided not to spend any more money for this line of paint. The only paint that we still advertise on TV is for the Dulux brand as a whole, and then for Wash 'N' Wear 101, because it is our strongest-selling paint and the paint itself can support the expense of the commercials.

Group: Did you have any point of sales material?

Keene: Yes, we had brochures telling the benefits of the paint right next to the cans, almost in every paint store.

Group: Did the brochure include both environmental and health benefits?

Keene: Yes.

Group: Was there any training of store staff about the paint?

Keene: Oh, of course. We have the Orica Academy in Sydney, Perth, Brisbane, and Melbourne, which we use to educate sales associates about our new products. But the turnover rate for stores is very fast. They hire students who tend to work only for the summer, so it is very hard to control the knowledge of sales staff at a store. But we do hold the daylong training sessions.

Group: How else can we promote the sales?

Keene: Well, you can try government regulations. There was a convention in Kyoto, Japan and the Kyoto Agreement was set in place there to reduce greenhouse effect. Australia did not sign the Agreement…there were some politics involved in that. You can also educate people more from the angle of "Sick Building Syndrome."

Group: What's that?

Keene: Well, sick building syndrome is when people become sick when they are in a new house. And it is true that you can get sick. The air quality inside a house for the first three months after the building is complete is not great. The carpet, the paints on the wall, and the furniture all have VOCs in them and give off a very bad smell.

Group: Oh, ok.

Keene: And the architects like to use the low VOC paints because it reduces the effects of sick building syndrome.

Group: Do you mind if we ask you the sales statistics of low VOC paints?

Keene: BreatheEasy contributes to less than 1% of Orica's decorative paint sales.

Group: Is this out of both retails and trade?

Keene: Yes. The greatest success of the paint was with the Olympics. They made it a green game and used low VOC paints for all the athlete villages. Moreover, the irony of it all is that the athletes trashed the village and when they re-painted the

apartments after the games, they went and used conventional paints on top of the low VOC paints.

Group: That's a shame. Now what is the future of low VOC paint in your company?

Keene: There is background research on low VOC paints in the company, but presently, we cannot devote too much time and money to it because there is no return from the sales. What we have on the market we will keep on the market. As regulations become stricter, the industry will eventually have to lower the VOC in paint to the level of zero. And we will already have something on the market. But we don't plan to expand on what we have right now.

Group: What are the ranges that you have now?

Keene: Well, we have a sealer undercoat, as well as finishes in flat, low sheen, and semi-gloss for low VOC. Flat, low sheen, and semi gloss are available in vivid white base, extra deep base, and accent tint base.

Group: What are all these bases?

Keene: Vivid white is just a white base, extra deep is for lighter to medium dark colours, and accent tint base is for dark and rich colours.

Group: Thank you very much for your time. Is it all right if we ring you if we have any more questions?

Keene: Certainly. Here is my card.

Group: Thank you!

Keene: No worries.

Appendix F – Manufacturer Interview: Wattyl

Date: 23 March 2004
Time: 2:00 - 3:00 pm
Location: Scientific Fire Services, telephone
Interviewees:

John Rankin, Technical Manager, Wattyl
Ben Murphy, Marketing Manager, Wattyl

Interviewers:

Fotjana Bida, assistant secretary
Ryan Carey, secretary
Kyna Hu, spokesperson

(We spoke to John Rankin first, as he was our initial contact. He referred us to Ben Murphy for the marketing questions.)

Hu: First of all, for the record, does Wattyl manufacture low VOC paint? What types of paints? Are you able to share sales statistics?

Rankin: Yes we do. We produce a line called Clean Air 3, available in both low sheen wall and ceiling types. We sell approximately 1000 L per year of low VOC paint, out of a total of 10 million L.

Hu: What other types of paints do you produce?

Rankin: We make the full line of solvent- and water-based paints.

Hu: Taking into account the low sales, do you anticipate that the range of low VOC products will increase, stay about the same, or be taken off the market?

Rankin: There certainly won't be any increase in the range of products, but I don't anticipate that we will be taking anything off the market at this point either.

Hu: What are the manufacturing cost differences among the three different types?

Rankin: Solvent- and water-based paints are similarly costing to produce, while low VOC paints cost approximately 10% more.

Hu: How and why were low VOC paints developed and initially marketed?

Rankin: The 2000 Olympics in Sydney were dubbed the "Green Olympics", so the Olympic committee used all of the most environmentally friendly products in the construction. Low VOC paint was one of those products, and we created the line for use on all of the interior surfaces, for 30 to 35% of the buildings.

Hu: And beyond the Olympics, how were they marketed?

Rankin: We had flyers at the point of sales, telling consumers about the lower odour and the benefits to the environment.

Hu: How would you increase the sales?

Rankin: Through law making – if people are forced to buy it, they will, of course.

Hu: Are there any quality differences between the paints?

Rankin: Solvent-based paints are tougher; water-based and low VOC are fairly similar.

(We were transferred to Ben Murphy. Mr. Murphy has only been working at Wattyl for a few years, which does not include the time when low VOC paint was initially released.)

Hu: Do you agree that the sales of low VOC paints are low?

Murphy: Yes I do, mate. The sales are very low.

Hu: Have there been any large purchases? John mentioned that the Sydney Olympics were a major purchaser of the product.

Murphy: I was not here at that point, so John would know better that I. However, we recently received an order from Stockland, looking for all low-VOC products, in order to fulfil a government initiative called "Green Smart."

Hu: Why do you think the paints are selling so poorly? Are there quality differences, or price differences?

Murphy: Well, the primary culprit is price. As John said, it costs 10 to 15% more to produce low VOC paint, and, due to low demands, that increased cost can escalate by the time it gets to the consumer. Also, there is a limited range of colours that can be created, since the tinter adds VOCs to the paint. In addition, there is a limited range of types of paints – only low sheen, which are not good for hospitals (which would otherwise like a low VOC product) because they are not easily washed. VOCs are necessary to create higher sheen products.

Hu: Would it be possible to create a higher sheen product at all, at the low VOC level?

Murphy: Well, yes…but at great expense.

Hu: How would you go about increasing the sales of this product?

Murphy: By lowering the price – finding a cheaper formula, and by increasing the range of colour choices.

Hu: Taking into account the low sales, do you anticipate that the range of low VOC products will increase, stay about the same, or be taken off the market?

Murphy: Low VOC paints are not successful on the market, but there's no reason to take them off – there's a strategic advantage to keeping them around, in case there are any developments in the industry, so we already have the infrastructure in place to produce the paints.

Hu: Thank you very much!

Appendix G – Manufacturer Interview: Taubmans

Date: 30 March 2004
Time: 3:00 - 3:15 pm
Location: Scientific Fire Services, telephone
Interviewee:

Allen Kesby, Technical Manager, Taubmans

Interviewers:

Fotjana Bida, secretary
Ryan Carey, assistant secretary
Kyna Hu, spokesperson

Hu: Hello, may I speak with Paul Miller?

Kesby: He is out of the office today; do you want to leave a message?

Hu: Well, we had scheduled a telephone interview with him today at 3:00 pm.

Kesby: Are you the group of students working on project related to low VOC paints?

Hu: Yes.

Kesby: All right then. My name is Allen Kesby, and Paul asked me to help you guys with any technical questions related to paints that you might have. He apologizes for missing the interview, but he was very busy today.

Hu: Oh, okay. How are you Mr. Kesby?

Kesby: I am good. Thank you.

Hu: Great. Mr. Kesby, have you worked on the production of low VOC paints, known as low odour or low environmental impact paints, with a VOC content level of 5 g/L or less?

Kesby: Yes, I do know about them but we no longer produce any commercial products.

Hu: You used to produce that type of paint?

Kesby: Yes, years ago. It was 1995 when we first produced this kind of paint and called it "Living Proof Silk", but did not last long in the market because it did not have good block resistance.

Hu: How were the sales? How did you advertise it?

Kesby: Actually, the sales were pretty good; we were selling 1 million litres per year. To advertise it we just said it was low odour paint. That was, of course, until 1998 maybe 1999 when it died.

Hu: So why exactly did it "die"?

Kesby: It was partially the blocking resistance problem, and partially because in 1998, Dulux launched a new product with kitchen resistance, which was better resistance qualities to wine, coffee and other stains than our product. Therefore, at that time we had to reformulate Living Proof Silk in order to improve qualities, for example make it more resistant to coffee and wine. Today's version has a 50 g/L VOC content.

Hu: Was the paint for interior surfaces?

Kesby: Yes, and it was low sheen, or low gloss in APAS terms. It was used only for walls, not for ceilings.

Hu: Was there any other quality differences between the Living Proof Silk paint and other lines of products?

Kesby: The major issue is the difficulty of attaining satisfactory wet edge without using VOC solvents. Our paint currently uses propylene glycol as a solvent to slow the drying of the paint. With 0% VOC, in hot weather, the paint would dry too quickly and that would make it difficult to brush or spread the paint evenly.

Hu: Are you currently researching low VOC products for possible release?

Kesby: No, we're just keeping abreast of the industry and market, and waiting for the major raw material suppliers to develop new formulas.

Hu: So, when you took the VOC out, the substance you added, was it more expensive? Did this increase the price of the product?

Kesby: Actually, the price was no problem at all; I think it was the same. We even saved with that product; because we took out the substances VOC and added more water, no additional cost was needed.

Hu: Do you know how that affected the cost of the actual paint?

Kesby: No, that's set by the market.

Hu: Well… these were the questions we had for you. Is there a number we can call you if we need additional information?

Kesby: The number you called is fine, and feel free to call me anytime. Good luck with the project.

Hu: Thank You! Good-bye!

Kesby: No worries, bye!

Appendix H – Manufacturer Interview: Galmet

Date: 18 March 2004
Time: 2:00 - 3:00 pm
Location: Scientific Fire Services, telephone
Interviewee:
Ron Bill, Galmet Paints and Chemicals
Interviewers:
Fotjana Bida, secretary
Ryan Carey, assistant secretary
Kyna Hu, spokesperson

Hu: Have you ever heard of low VOC, low odour, or low environmental impact paint?

Bill: Yes.

Hu: Have you ever purchased it?

Bill: We are a manufacturer.

Hu: Oh, sorry! We found you through a phone book that lists wholesalers and manufacturers, but they did not differentiate between the wholesalers and the manufacturers.

Bill: No worries – is there anything I can help you with then?

Hu: Are there any price differences between low VOC, water-based, and solvent-based paints?

Bill: Water-based and solvent-based paints have similar prices, but the low VOC paints are sold approximately double the prices of water-based paints.

Hu: Is there any particular reason why this paint is so expensive?

Bill: Well, it costs a lot to manufacture it. When we take the VOC components out from the paint, we have to replace it with other chemical components, which are very expensive.

Hu: How are the sales of this paint, accounting for it being so much more expensive?

Bill: It's doing okay. About 25% of our AUD$4 million annual income is from low VOC paints, so about a million is from selling low VOC paints.

Hu: Wow! Why would people want to buy low VOC paint if it costs so much more than water-based paint?

Bill: The paint itself lasts longer in the environment compared to water-based paints. There is also less labour cost. In general, you need about 2-4 coats when using water-based or solvent-based paints, but with the low VOC paints, you only need 1-2 coats. In other words, you actually buy fewer amounts of paint and end up paying less because it does not take as much time (since you apply less number of coats) for the painters to finish the job.

Hu: How did you market this paint?

Bill: Well, our customers are mostly contractors and architects. When we have a new product, we usually mail to them its characteristics and if they were interested, they would purchase it. The same method was followed to advertise low VOC paints.

Hu: And how did they respond to it?

Bill: The architects loved it, but the contractors said it is too expensive. However, they claim that after using the paint, they liked it, because its benefits were occupationally healthier for the painters. For the moment, the contractors are the last persons we anticipate to pay more when they do not need to.

Hu: What do you think is the best way to go about increasing low VOC paint sales?

Bill: Educate people, decrease the price (by finding better technology), and, as they did in California, write legislation to force people to buy them. You guys

should know by now that if paint customers had a choice, they are most likely to purchase the cheaper products.

Hu: Thanks a lot!

Bill: No worries.

Appendix I – Manufacturer Interview: Rohm and Haas

Date: 20 April 2004
Time: 10:00 - 10:35 am
Location: Scientific Fire Services, telephone
Interviewee:

Neil Duggan, Technical Manager of Architectural & Functional Coatings, Rohm and Haas

Interviewers:

Fotjana Bida, secretary
Ryan Carey, spokesperson
Kyna Hu, secretary

Carey: Hi Neil Duggan!

Duggan: Hi Ryan. Could you please call me back in a few minutes? I just came to the office and I was going to get a cup of coffee just before the telephone rang.

Carey: Sure, no problem.

(after 5 minutes)

Carey: Hi Mr. Duggan, how are you today?

Duggan: Not bad. As I understand, you want to chat about low VOC paints, their formulation and production…

Carey: Right.

Duggan: All right, I have another meeting at 10:30 am, but if we haven't finish at that point, you are more than welcome to e-mail me or call me for further questions.

Carey: Thank you! I also have my other two project partners, Kyna and Fotjana, who will be listing to this conversation. They might ask any additional question that they might think of during the interview.

Duggan: Okay. Before we start, I would like to request a copy of your report to read after you have finished. We have being working in the same kind of project for a while, and it would be helpful to see what kind of results you have reached. Anything that could help us to market this kind of paints would be greatly appreciated.

Carey: Sure. We also have a final presentation on May 4; would you be interested in attending that as well?

Duggan: Well…I can't because I will be travelling, but if you tell me what date and time the presentation will be, I could send someone to listen and report back to me.

Carey: Great, we will send you an invitation then. So, back to the project: as we understand, you have been involved in the formulation/production of low VOC paint. Could you tell us if there is any trade off between the VOC content and the quality of paint?

Duggan: Just to warn you, I have the habit of rambling a lot, but you can stop me any time if you are not clear about something. As you probably know from your research, the decorative paints represent the highest percentage in the Australian market. We are very proud of the quality of the paint, which we call premium for a reason. Most companies are concerned about getting a good "wet edge" or "open time" in their paints. Paint will have a poor open time when it dries too quickly, a quality that is driven by the volume solids in the paint. If you look at the percentages of solid material per litre, you will the find the following: in Australia, the premium has at least 40% solids, in Europe the water-based paint contains about mid 30% solids, and in North America, the water-based paint has 30% to 34% solids. The paint is more efficient when it has high percentage of solids, because there is more substance actually remaining on the wall. However, there is also much less open time when the percentage is high, because there is less solvent to evaporate. When lower-VOC solvents replace regular solvents, it is difficult to maintain a good open time, as lower-VOC solvents will evaporate quickly. In Europe and the U.S., manufacturers can easily compensate for this because of their lower volume solids, but Australian manufacturers have more work to do. The warm weather is another factor that makes wet edge difficult to maintain. Most of the Australian population lives on the coast, with longer warmer months than other places. So, we have more

constraints here when we formulate paint. It doesn't mean that we can't produce good low VOC paint; it is just more difficult.

Another issue is benchmarking; all paints are compared to solvent-based paints as they're developed and used, just because those came first. When we're formulating paints, solvents and enamels often are found superior. But we have come a long way, and I can say that there is a clear advantage to using water-based products for interior broad-wall coating, and not just in terms of health and the environment: the performance is actually superior. However, I would prefer solvent-based paints over water-based paints for woodwork such as trim, doorframes, and window frames. Solvent-based paints often have better block resistance – do you know what that means? – hardness, and mar or mark resistance.

The level of VOC in water-based is usually 100 g/L but it can range from 70 g/L to 110 g/L, and in solvent-based there is about 450 g/L of VOC. It is hard to encourage people to move from solvent-based paints use to water-based paints use, because the need for environmentally friendly products is not necessary that high. Paint consumers look for good block resistance, washability, and mark resistance. All premium products do have high stain resistance quality, which means you can wash the wine or coffee stains in wall very easy (soap and water).

To get the right performance from the low VOC paints is tough, because when you lower the VOC content the resins get softer and the stain resistance quality is compromised. It doesn't mean you cannot get it to the right performance, but this technical difficulty adds to the cost of the paint. We often find that we have to substitute expensive components for the high VOC components taken out.

Carey: So, the manufacturers will increase the cost because the price of the production increased?

Duggan: Oh no, the manufacturers do not set the prices. It is the paint distributors and paint stores that decide on the price of the product. We also have chains in U.S as well; 1/3 of our paint is sold in U.S stores such as Home Depot, and they decide how much they will sell it.

Carey: The price of the production increases because the price of the raw material increases, but that doesn't affect the price of the product on the market?

Duggan: No. The paint market does not see many increases in price, despite inflation and changes in the economy. In the late 1980s 4 litre of paint costed [AUD]$49.99; that only increased to [AUD]$55 in the late 1990s, and since then has remained the same. This is in spite of drastic increases in the quality of the paint has changed. It is the consumers who drive up the price of a product, but since there is a high degree of competition on the Australian paint market, there hasn't been any increase.

Oh, I have to leave, and go to another meeting.

Carey: That's fine. You gave us a lot of information, which is very helpful for our project. If we have further questions or we need to clarify some of the information given during this interview, we can call you again. Thank you for your time.

Duggan: No problem. I am happy that I could help, and I am actually very interested to read your results. Don't forget to send me a copy of your final proposal, and good luck!

Group: Thank You! Have a good day!

Duggan: Bye.

Appendix J – Retailer and Distributor Interview Questions

1. Do you carry a range of the ultra low VOCs? If yes, which products?

2. Is it important to have such a range available for sale? Why or why not?

3. Does your store promote any environmental aspect of paint in your sales process?

   If so, which aspects?

   If not, why not?

   Is this policy likely to change in your store?

4. Do customers ask for either low VOC or low solvent product when they buy paint?

5. Do they buy it once they learn that such paint is available?

6. Do you know of any quality differences between low VOC paint and other products?

7. How can the sales of this paint be increased? What do you think would be the most successful method of promoting it?

8. Do the manufacturers provide any assistance for sales? Is there training offered?

9. Is there any point of sale material provided to explain the benefit of the paint?

10. Percentage of low VOC paints sold? Water-based paint? Solvent-based paint? Price of the ultra low VOC paint (compared to water-based and solvent-based paint)?

Appendix K – Retailer Interview: Solver Paint

Date: 1 April 2004
Time: 1:00 pm – 2:00 pm
Location: Solver Paint Store
Interviewee:

Julie Gallop, Branch Manager, Solver Paints

Interviewers:

Fotjana Bida, secretary
Ryan Carey
Kyna Hu

(The interview in some aspects could be considered informal, since most of the questions we asked were while we were having a tour of the store and looking at different paint products.)

Group: What is the best selling paint in your store?

Gallop: Definitely the ultra-premium products.

Group: Do you carry any products from Dulux?

Gallop: No, all our products are Solver brand; Wattyl is our parent company.

Group: Do you sell low VOC paints?

Gallop: No, we don't – Solver doesn't have any low VOC paints.

Group: Have you heard about low VOC paint before?

Gallop: Yes, I actually was working for Dulux when the "BreatheEasy" line came into the market. But the sales of that paint were very low; people would ask about it and look at the brochures, but they would not purchase it. It was very expensive, and in my opinion, it was advertised too early.

Group: What do you mean by too early?

Gallop: Well, people were not as aware of environmental and health issues when they marketed it back then. I think there might be a better response if they marketed it today because more women with kids are coming into the store to shop for paint.

Group: How did they market this kind of paint?

Gallop: Well, there was a TV commercial, and if I remember correctly, there was a mother holding a baby in her arms… something like that. It had a very warm and fuzzy feeling to it. I cannot remember exactly what it was, sorry.

Group: What was the people's response after the commercial?

Gallop: Not good, in terms of sales; they would come and ask about it but they would not buy it. I guess the price was too high, and there was not a very wide variety of colours.

Group: Did the labels mention the benefits of having a low VOC content?

Gallop: Oh yes, I'm sure they did…but no one ever reads the labels.

Group: Nobody? So would you say that even the APAS label on each can doesn't make any difference to your customers?

Gallop: No, it doesn't make any difference.

Group: Well, what other strategies could have been used to market it?

Gallop: I think that the TV commercial was very good, and clear, right at the point. They could try radio, too. I really think it was just too soon to put it on the market.

Group: If they mentioned the environmental effects as well, or the effect VOC has on pets, would that made a difference?

Gallop: No, and if the TV commercial with all its warm fuzziness did not change their attitude toward this paint, I don't think that any environmental one would have. They probably should start that commercial again, because based on my

experience, the knowledge of people about paints is better than it was ten years ago. Not only has that, but the number of women purchasing paint increased significantly.

Group: How did the manufacturer support the release of the product? Were there training sessions, or literature given to you?

Gallop: For any new product release, there is a "product release party", where everyone involved in the sales of it – especially retail store managers like me – would go and learn about the paint. When products are just changed slightly, or a new colour set comes out, or something small like that, the manufacturers just send out reps who explain these changes to the managers and the information trickles down. For a brand new line like BreatheEasy, there would definitely have been a big event given by Dulux, though. There were brochures next to the paint, which were helpful in telling people about the paint.

Group: What about if the manufacturer gave a demonstration of the paint, would this be a good approach?

Gallop: We have had some demonstrations for local tradesman, and they came and we showed them this paint with textures.

Group: So would that be more for demonstrating a specific technique on how to paint than to advertise a certain type of paint?

Gallop: Yes. Texture paint gets hard to use and you need different rollers and procedures to get the effects you want.

Group: What if a customer asked you for a sample; would you give them?

Gallop: If a customer is not buying a decent amount of paint, I don't really give samples. I gave a sample to someone who was doing 126 square-metre house, but for a regular house I would not give a sample. I also give samples to sales representatives that travel to contractors and sell the paint, because they would be getting us new customers.

Group: You have both water- and solvent-based products, correct?

Gallop: Yes, but we sell much more water-based than solvent-based paint.

Group: Is there any price difference between these two kinds of paint?

Gallop: No, not really.

Group: How about quality differences?

Gallop: Solvent-based are better than water-based in some cases. I might be a little old fashioned but I would rather use solvent-based than water-based for some types of painting. There are two reasons. Water-based paint – even high gloss water-based paint – cannot achieve a very high shininess, just because of the different paint components. The other reason is that water-based paint dries a lot more quickly than solvent-based paint, so that when you use water-based paint on smaller surfaces, like the trim of a door, you can see the marks that the paintbrushes left; in other words, it's not that smooth. With solvent-based paint, you have a longer drying time, so by the time it dries the paint will have smoothed out any brush marks, giving a better finish.

Group: What are the qualities that usually consumers look in paints?

Gallop: Consumers are concerned with washability and price. Most paints look the same to them; the difference is that stains in surfaces where the premium expensive paints are applied can be washed very easy. In cheap paints, the stains do not really come out that easy.

Group: Do people look for durability in paints?

Gallop: Not really. Paint ages as soon as it is on the wall and people usually don't notice the difference.

Group: How often do people in Australia paint their homes?

Gallop: In average, it is about 4-5 years.

Group: We heard that Australians paint their houses once in 17 years; is that number even possible?

Gallop: It depends on the paint quality. Our ultra-premium line is guaranteed to have a minimum of ten years life and it will usually last that long. However, people get sick of same colours on their walls very quickly; therefore, they would want to repaint long before that time has come.

Group: What is your target market, contractors or individuals?

Gallop: As for right now, it is about half-and-half. I think the retail is growing and winning over the trade market this past month.

Gallop: By the way, why are you guys working on this project? Can you explain me a little bit more?

Group: We actually go to a technical school, and this project is not directly related to our major rather than it is one of the university's requirements. In order to graduate at our university, we need to complete three major projects. One of them is an Interdisciplinary-qualifying project. Worcester Polytechnic Institute, the university we attend, offers the opportunity to complete this project abroad, and we chose Australia. The arrangement is that there are Australian local organisations that offer to sponsor mini-projects for several teams of students, who will work for a semester to achieve and complete the requirements of these projects. Our project was related to low VOC paint and we are working for APMF. In our case, we want to educate people about the benefits of low VOC paints and hopefully convince them to purchase it, to eventually increase the sales of this product.

Gallop: That is nice. How is the project going so far?

Group: Everything is going great so far. We have been interviewing many representatives from manufactures, environmental organisations, and contractors, and we have surveyed many painters.

Gallop: If you guys want, I can bring you to "PaintRight" store and to Bunnings, so you can check the kind of paints they have and maybe even talk to them? I may know someone at "PaintRight" that may help you.

Group: That would be great. Thank you!

(We did not have a chance for extensive interviews with any personnel at PaintRight store, because they were “very busy”, or possibly because they did not want to talk about any of Dulux’s brands, since they did not carry any. However, at Bunnings, we found that Berger BreatheEasy was sold in retail, but they did not carry any low VOC paint in trade such as Wattyl CleanAir3. We had a great time browsing the store and pretending to buy low VOC paints, in order to get some information on how much low VOC paint brands are advertised, how knowledgeable the sales staff are, and how well they informed the consumers.)

Appendix L – Distributor Interview: Mitre 10

Date: 20 April 2004
Time: 2:00 – 2:30 pm
Location: Scientific Fire Services, telephone
Interviewee:

Peter Darbyshire, National Business Manager Paint & Decorator at MITRE 10

Interviewers:

Fotjana Bida, secretary
Ryan Carey, secretary
Kyna Hu, spokesperson

Hu: Hello Mr. Darbyshire! This is Kyna; we had an appointment for an interview today. How are you?

Darbyshire: Hi Kyna, I am fine, thank you.

Hu: To start, do you carry a range of low VOC paints?

Darbyshire: Yes, we have about 600 Mitre 10 stores and True Value stores that carry low VOC paints.

Hu: Does the True Value stores that you speak of has anything to do with the True Value stores in the states?

Darbyshire: No. They are distinctly different stores.

Hu: What brand of low VOC paints are in your store?

Darbyshire: We mostly carry water-based technology paints. 85% of our paints are water-based; the rest is low VOC and solvent-based paints.

Hu: Is there any price differences between low VOC paints and water-based paints?

Darbyshire: Well, there is a marginal difference. Our water-based paints are priced between mid AUD$40 and high AUD$40 and our low VOC prices are from mid AUD$50 to high AUD$50.

Hu: Does your store promote any environment aspect of paint in your sales process?

Darbyshire: No, there isn't much in store promotion

Hu: Is there a quality differences between low VOC paints and other paints?

Darbyshire: Well, there isn't much difference between water-based paints and solvent-based paints. The water-based technology is quite good. The substitute for solvent-based paints we usually suggest to customers is "Aqua Enamel" from Dulux. The effect of it is similar to solvent-based paints.

Hu: Do people ask about BreatheEasy?

Darbyshire: In order to have good sales for that kind of paint or any other new product in general, it requires a continuous process from the manufacturers to keep the advertisements going, so consumers will be updated and ask for it.

Hu: How can the sales of this paint be increased? What would be the most successful method of promoting it?

Darbyshire: In my opinion, it has to be industry-driven. I would suggest that APMF has some kind of training programs and the government should have new legislation requirements

Hu: So, there is no training program offered from manufacturers?

Darbyshire: No.

Hu: Is there any point of sale material provided to explain the benefits of the paint?

Darbyshire: No.

Hu: Could you tell me the percentage of low VOC paints sold?

Darbyshire: It is low, too low, compared to other water-based products. I have been in this company for 2.5 years and *BreatheEasy*® was only mentioned once. I could e-mail you the sales statistics.

Hu: That would be great.

Darbyshire: And could you please send me the information you have from Sherwin-William products.

Hu: Sure, I will do that.

Darbyshire: I would also like a copy of your project. Our company is a community base company and we have a program called “Land Care” to promote environment and health awareness. We would like to have any information that you have for promoting low VOC paints.

Hu: Sure. We’ll send you the final draft of our project. Thank you for your time. Bye-bye

Darbyshire: Good Luck! Bye.

Appendix M – Contractor Interview: Program Maintenance Services

Date: 15 April 2004
Time: 12:00 - 12:18 pm
Location: Scientific Fire Services, telephone
Interviewee:
Stuart Law, Program Maintenance Services
Interviewer:
Fotjana Bida, secretary/spokesperson

Bida: Hello, Mr. Law; how are you today?

Law: Good, thank you. I am sorry I did not make it for the interview on Wednesday, but I did not have a chance to come to Port Melbourne. I could not leave the office today, so I guess the phone interview will be the only way to help you.

Bida: Would you like to know a little bit more about our project?

Law: Yes, that would be helpful.

Bida: Well, we are a group of student from United States working on a university project. We are working with the APMF to promote the sales of low VOC paints, which in Australia are known as low odour or low environmental impact. This kind of paint is beneficial to both health and the environment, and our job is to find the lack of interest of the people to purchase it.

Law: All right, so let's start with the questions.

Bida: Have you ever heard of ultra-low VOC paint prior to this contact?

Law: Yes, I have.

Bida: Have you ever purchased ultra-low VOC paint for personal use, or for a client?

Law: Yes, but not too much.

Bida: What brands of paint?

Law: Bristol, they had a brand called *Low Odour* or something like that.

Bida: How about Dulux or Berger BreatheEasy?

Law: Oh, yes, I think we purchase those too.

Bida: Of all paint that you purchase, how much of it is ultra-low VOC paint?

Law: Between 0% and 20%

Bida: Are you aware of the existence of any health concerns associated with the use of conventional, higher VOC, paint?

Law: Yes, VOC is very harmful for the health of humans and animals, and there are many issues related to it.

Bida: Could you please list any that you know?

Law: Asthma, eye irritation, skin irritation, dizziness, and other things.

Bida: Are they of concern to your company or to your clients? Do you have plans to address these issues?

Law: Depends on the clients, there are some that require only low VOC paints such as hospitals, child care and age care.

Bida: Are you aware of the existence of any environmental concerns associated with the use of conventional (higher VOC) paint?

Law: Hmm…yeah, there are some.

Bida: Please list any that you know.

Law: The only thing that comes to mind is that they cause contamination of soil.

Bida: In your experience, are there any significant quality differences between ultra-low VOC paint and conventional water-based paint?

Law: Yes, there is definitely a quality difference between the paints. The coverage is not as good as when you use conventional paint. What it means is that when you use low VOC paints, you need to apply several coats because you can still see the old colour in the walls.

Bida: In your experience, does ultra-low VOC paint differ in price from conventional paint?

Law: Ultra-low VOC paint is more expensive.

Bida: Can you give the approximate value of the difference?

Law: I am not sure; I would say it is about 10% more expensive than conventional paints.

Bida: Does the price difference prevent you from purchasing it?

Law: Not really, I do not care much about the price. I am more concerned with the quality of the paint than with its price, because it affects the quality of my work.

Bida: What value to your organisation would the following have: specific "ultra-low VOC" training from manufacturers?

Law: No, I don't think this is necessary

Bida: How about government regulation requiring the use of ultra-low VOC paints for specific jobs?

Law: Well, if the government puts in regulations, then we have to use low VOC paints.

Bida: Are you aware of any negative aspects of ultra-low VOC paint?

Law: Nothing beyond what I've already mentioned.

Bida: Well, these were all the questions I had for you. Do you have other information that could be helpful for this project?

Law: Not really.

Bida: Thank you for your time.

Law: No worries, bye.

Bida: Bye.

Appendix N – Environmental Interview Questions

1. What are the specific environmental and health effects of VOCs from paint?

2. Were you ever involved in marketing any environmentally friendly products, or about educating the public about the dangers of substances in products?

3. What were the products and what were the methods that you used to market the products?

4. How successful were those methods? If they were not successful, were there any other methods used in replacement?

5. What is the best method to educate the public about the dangers of VOCs in paint?

6. What method do you think would be best to increase the sales of low VOC paint?

7. Can we convince people to base their buying decisions on health and environmental factors, rather than solely on price?

8. Is there anyone else we can talk to that would be able to help us?

Appendix O – Environmental Interview: EPA

Date: 25 March 2004
Time: 12:30 - 1:30 pm
Location: EPA, 40 City Rd, Southbanks, Melbourne
Interviewee:

Frank Mitchell, Environmental Educational Coordinator, EPA

Interviewers:

Fotjana Bida, assistant spokesperson & secretary
Ryan Carey, spokesperson
Kyna Hu, secretary

(After greeting each other by shaking hands and introducing our names we went to a conference room, where we conducting our interview)

Group: Hello, Mr. Mitchell. Thank you so much for your time.

Mitchell: No problem, I just hope I could help you because I don't really know a lot about VOCs.

Group: You never know; we actually are open to any kind of information that could help or teach us on how to educate consumers about the benefits of low VOC paints.

Carey: Do you know of any specific health concerns regarding VOCs in paints?

Mitchell: Just the general ones – it is a precursor to ozone, as I'm sure you know. Steve Brown from CSIRO is an expert in indoor air quality, and he would be a good contact regarding specific concerns.

Carey: Do you know about any quality differences between low VOC paints and water- and solvent-based paints that would make consumers chose one over the others?

Mitchell: When I think low VOC paint, I think water-based paints. Solvent-based paints are the best for exterior surfaces because they are more weather resistant. Water-based paints wear badly in surfaces that face the sun or the ocean because the salt ruins it. That is why most people used to choose solvent-based paints over

water-based paints. But today, water-based paints are comparable to solvent-based paints even as an exterior paint. Although it may not be low in VOCs, as technology progresses, I believe that one-day paint manufacturers would produce water-based paints with no VOC content and much more better quality that they can even substitute the solvent-based for exterior works. So, I would say that the industry is fixing the problem itself, as there are the regulations lowering the levels of VOCs in paints every year. This is just my opinion, and I never worked on a project that involved VOC in paints, I have been concentrating more in other major pollutants.

Carey: What are these major pollutants?

Mitchell: During winter, the greatest source of pollution is wood smoke. People tend to use and burn a lot of wood during that season, for whatever reason, and that increases the pollution. Another major source of pollution is the fuel of cars, often during the summer. If you need more information on air pollution, I recommend you go and talk to someone at Hospital Admissions Analysis, as they would have information about the hospital admissions of patients affected by various pollutants, such as the VOCs that you're looking at. With that data, you could even determine if paint is a major problem.

Carey: How do you educate people about any kind of environmentally friendly products?

Mitchell: Well, first I would define the target market, who I am trying to reach. In your case, you have several, such as suppliers, wholesalers, contractors, householders, etc. For each of them I would have a different approach.

Cost is a large factor, of course. The government could have laws that mandate the cost of the products. For example, what the government did for alcoholic beverages is to mandate that beverages that have a lower percentage of alcohol have a lower price compared to other beverages that have a high percentage of alcohol. They did about the same thing with tobacco by adding higher taxes, which support the "Quit" campaign against tobacco launched so far. Previously, there a similar price structuring for leaded versus the healthier unleaded petrol.

Carey: What would be the best point of sale method?

Mitchell: I would recommend progressing in two ways: have a brochure that lists all the health and environment benefits, and create a training program for the retailers, focused on issues coming from VOCs.

Carey: What would you put in a brochure?

Mitchell: Main issues you want to point out, which, as I understand, are the health concerns. A household has usually 3-4 people, and if any of them is at risk, they will definitely buy the paint. Australia has a very high occurrence of asthma so you might want to mention how VOC causes bad effect on people suffering from it. Oftentimes, children, elders, and people with pre-existing conditions are at risk. Australians have a "duty of care" to help everyone else, which is very relevant to the topic of the environment. You can also look at similar VOC culprits that affect indoor air quality.

Carey: What are the major campaigns that the EPA has undertaken, using brochures?

Mitchell: We have just completed a large campaign in the dairy industry, to make dairy farmers aware of our "zero runoff" policy for dairy farms – they can't just let the dirty water from washing cows and equipment run off their property.

Carey: Do you have any other contacts for us?

Mitchell: I would suggest you interview Neil Wong, because he is the technical expert on measuring the air pollution. Another person you can talk to is Steve Brown at CSIRO because he has worked more in projects involving VOC. Finally, when we go downstairs, at our lobby library, we have some brochure that you can use as examples. In addition, the following websites might be helpful:
www.npi.gov.au (National Pollutant Inventory – VOC totals, sources)
www.epa.vic.gov.au/air/aq4kids (Air Pollution Monitoring)

Carey: Thank you so much. These were some of the questions we wanted to ask.

Mitchell: I am sorry I could not help much, but I will send you an e-mail with other contacts.

Carey: On contrary, you were very helpful, and this interview was very productive. Thank you again, and have a good day.

Mitchell: Thank you! And don't hesitate to e-mail me if you had additional questions.

Group: Thanks. Bye!

Appendix P – Environmental Interview: Environment Australia

Date: April 5, 2004
Time: 2:00 pm – 3:00 pm
Location: Scientific Fire Services, telephone
Interviewees:

Paul Kesby, director of air quality from Environmental Australia
Sue May, expert in measuring the air quality

Interviewers:

Fotjana Bida, secretary
Ryan Carey, spokesperson
Kyna Hu, secretary

Carey: Hello, Mr. Kesby. How are you today?

Kesby: I am fine, thank you Ryan.

Carey: Here are my other two project partners, Kyna and Ana, who will be listening to our conversation and ask you any additional question they might think during it.

Bida & Hu: Hi Mr. Kesby.

Kesby: Oh that is fine, Sue May is here too, and you can ask her any questions you need to. She is an expert and she might know more than I do about the VOC emission.

May: Hello everyone!

Carey: Do you know about the effects that VOCs have on the environment and health of humans?

Kesby: I don't have any specific knowledge about it, but I am aware of the health sensitivities due to the emission of VOC into the air.

Carey: Are you aware of any kind of study concerning these health issues?

Kesby: We had worked with National Environment Measuring, where we were monitoring the standards of VOC levels in the air and how they affect the health of people.

Carey: Do you know about any quality differences between low VOC paint and other paints?

Kesby: I don't know anything about that, no.

May: There is actually a lot of information in the Internet. If you go to our website, you might find information about the quality differences between these types of paints. I would suggest that you look also to any clinical studies that might have been done concerning how VOC affects the health. We did studies, which were more exposure of the levels of VOC in Australia coming from the major sources such as fuel of the cars. We did not look at paints because they were not considered a major source. These studies were mostly clinical, but some have been done about population exposure. I will send you some of these studies electronically and you can look over them.

Carey: Thank you! Were you involved in any kind of educational campaign that was trying to promote any type of environmentally friendly product?

Kesby: Yes, we have been doing some educational campaigns. One was called "Wood Smoke", for which we were pointing out the health effect to people when exposed to smoke. "Air Watch" was a campaign done in schools, and "Smog Busters" was one that concentrated in the health effects caused by vehicle emission.

Carey: What methods did you use to market them? Did you use any type of brochures, pamphlet or others types of ads?

Kesby: For the "Wood Smoke," we had TV commercials, brochures (instructions on how to apply were included), radio and newspaper commercial, and seminars. For "Smog Busters," we used "speaking tools," in other words, we would send people to conduct seminars and even demonstrate the product benefits.

Kesby: We do not really sponsor any particular product. To sponsor one particular product requires a large assessment of the product; knowing your target market

is not enough. In your case, you need to know all the aspects of manufacturers as well.

Carey: Well, we have been talking with manufacturers and they have been giving us a lot of useful information.

Kesby: So, I would assume that low VOC paints have low solvents or no solvents at all, and there are a lot of benefits involved in order for the manufacturers to lower the levels of these solvents.

If you want to market low VOC paints, I would suggest that you make sure you know your target market, who is buying it, how much of it comes from commercial products…

Carey: Okay.

Kesby: Have you found any information that states whether VOCs have a great impact in the air and that paint is a major source of VOCs? Because if you want to market to government officials you need to have data that show that VOC is a problem and that something needs to be done about it. You need to make sure to mention that VOC is one of the major pollutants in the air and it has a bad effect on our health…I do not think they care about the environment as much as they would for the health. Do you know if APAS is doing anything about VOC emission?

Carey: Yes, we found that they have mandated regulations to lower the VOC levels gradually. The agreement is valid for 5 years, and then after 5 years they would lower them more. The regulation they have now about the VOC emissions is still higher than a 5 g/L "low VOC paint" level, what we're trying to encourage.

Kesby: I am not entirely clear; I guess…what is your project about?

Carey: Manufacturers have developed a kind of paint that has less than 5 g/L VOC in it, which is a good product to use, because of the harm VOCs cause. But people are not buying this kind of paint, and we are trying to find the reasons behind this lack of interest.

May: What is the output of your project?

Carey: We will write a report for our school, and we are hoping to find some methods that educate people about the benefits of low VOC paints.

May: Let me tell you something Ryan, people's knowledge about how much they contribute to the air pollution is very poor. Therefore, I would suggest that you concentrate on health issues rather than environmental issues. Try to make it more personal, and tell them how much the paint affects their children's and their own life. I think you should try focus groups; involve your target market in this project. Ask about their opinion, how do they want to learn about this product, and what they will to do in order to protect their health. Try to determine how they would be least likely to doubt the credibility of statements given by the marketing or environmental education organisation.

Carey: So, what you are saying is that we should gather some of the paint consumers, explain to them the health effects, and ask them what we need to do to convince them, and others like them to purchase this product in order to prevent these effects.

Kesby: Yes, contractors, governmental officials, and consumers need to be more informed about the health effects than the environments. You should focus your project on two issues: the effect of paint VOCs on indoor air quality and the contribution of paint VOCs to the overall environment. Homeowners will be more exposed to the paint than the contractors will, especially after the paint job is completed and the VOC components remain in the air while the paint dries. They would not want to live in a polluted ambient, and would not want to risk their children's health. Building managers could also be a good possible target to market the low VOC paints.

Carey: What do you think would be better for our educational campaign, a brochure, or a video?

Kesby: I would say a brochure that lists all the health benefits and instructions on how to apply the paint, because people would just pick it up, read it quickly, and then know about this product. If you have a video, that will take time that people have to stay in front of the television in the store, and not many people would want to watch it.

Carey: Ok, do you have any other suggestions for us?

Kesby: Look at our website to get an idea how we promotes “Smog Busters” and “Air Watch.” In addition, there is this magazine called “Australian Consumers Association” that is more product oriented. Make sure you know your target market. For example, we found that city of Lochenster in Tasmania has a major air pollution problem. We went there, did focus groups, and tried to educate the community.

Carey: That sounds good. Thank you for everything. Sue, you’ll be emailing me additional information?

May: Yes.

Carey: These were all our questions. Thank you for your time.

Both: No worries. Good luck!

Group: Thank you. G’day!

Appendix Q – Brochure Prototype

Facts:

- Regular water-based paint contains 70-90 g/L of VOCs.
- Indoor VOC levels are about four times higher than outdoor levels during painting.
- VOC levels can become even higher months after painting, due to continued emission.
- Approximately 150,000 new houses and other residential buildings are constructed each year in Australia.
- Each room requires about 8 litres of paint; an average house has 6 rooms: approximately 48 litres of paint are used to paint a house.
- In total, at least 504,000 kg of VOCs are in paint used in residential construction in Australia.

Thoughts:

Do you want those VOCs in your new home?

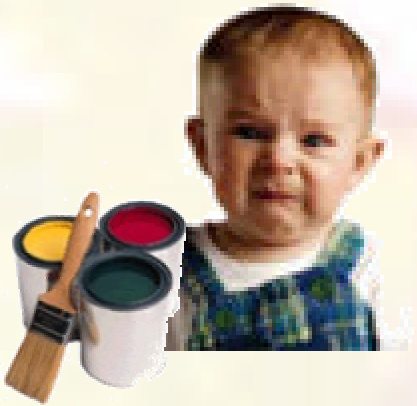
Do you want your children to be breathing all those VOCs?

Facts:

- 34,000,000 kg of VOCs were emitted into the air from 2002 to 2003 from architectural surface coating.
- An average human breathes approximately 8 litres of air per minute. That is more than four million litres per year.

Thought:

Do you really want to be breathing in that many VOCs a year?



Please, for the sake of your baby, use low VOC paints!

The Effects of VOCs from Paint on

Our Environment

Your Health

For more information in Victoria, visit the EPA website at http://www.epa.vic.gov.au , or ring your local EPA chapter at 03-9695-2722.

Visit the Department of Environment and Heritage at http://www.deh.gov.au or ring them at 02-6274-1111 if you have any concerns for indoor or outdoor air qualities.

This brochure was produced by Fotjana Bida, Ryan Carey, and Kyna Hu, of Worcester Polytechnic Institute in Worcester, Massachusetts, U.S.A.

VOCs affect the Environment by:

- Creating ground level ozone (smog)
- Destroying the good ozone layer
- Polluting the ambient air

VOCs affect your Health by:

Short-term effects:

- Causing wheezing or shortness of breath
- Triggering asthma attacks
- Damaging brain cells and making you feel "high"

Long-term effects:

- Causing cancer
- Causing infertility

These effects are more severe for children and the elderly!

VOCs (Volatile Organic Compounds) are among the most common air pollutants. Architectural paints have been ranked as one of the top ten VOCs emitters in Australia from 2002 to 2003. Architectural surface coatings emitted 34,000,000 kg of VOCs during this time. Think about what all those VOCs can do to the health of your and your family!

The next time you paint your house, be sure to ask for low VOC paint. This type of paint is available from major paint manufacturers and can be found in many hardware stores. Just ask for *Low VOC, Low Odour, or Low Environmental Impact* paints.

What You Can Do:

To help the environment and protect you and your family from VOCs, make sure that you use low VOC products, such as low VOC paints when painting your house. Also, by using public transportation, you can help lower the amount of VOC produced by automobiles.

Help Save the Environment!

Help Your Child's Future!