CCME

Canadian Council of Ministers of the Environment
Le Conseil canadien des ministres de l'environnement

A PLAN TO REDUCE VOLATILE ORGANIC COMPOUND EMISSIONS BY 20 PERCENT FROM CONSUMER SURFACE COATINGS

CCME MANAGEMENT PLAN
INITIATIVE V101
MARCH 1994
CCME-EPC-78E

The Canadian Council of Ministers of the Environment (CCME) is the major intergovernmental forum in Canada for discussion and joint action on environmental issues of national, international and global concern. The 13 member governments work as partners in developing nationally consistent environmental standards, practices and legislation.

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Prepared by the
National Work Group
on the Reduction of
VOC Emissions from
Consumer Surface Coatings

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Executive Summary

Ground-level ozone, a major component of urban smog, is caused by two precursor pollutants, nitrogen oxides (NO_x) and volatile organic compounds (VOC), reacting in the atmosphere in the presence of sunlight. Ozone is one of the more serious air quality problems in Canada today.

In recognition of the seriousness of the problem, the Canadian Council of Ministers of the Environment (CCME) decided, in October 1988, to develop a Management Plan for the control of NO_x and VOC. Initiative V101 of the Plan is a program to reduce VOC emissions from consumer surface coating applications by 20 percent by 1997. The CCME recommended that a Reduction Plan identifying measures to be taken and proposing a schedule to be prepared for that purpose. As per the CCME recommendation, the Reduction Plan should also target further emission reduction on a longer time frame for inclusion in the Phase II of the Management Plan.

A task force composed of representatives from the coatings industry, users, environmental groups, and federal, provincial, and regional governments was formed in the summer of 1992 in order to carry out the mandate of Initiative V101. At the first meeting in September 1992, a representative from the Canadian Paint and Coatings Association (CPCA) provided statistics to the task force that indicated a 30 percent reduction in VOC emissions from 1985 levels had already been achieved, citing market trends and industry initiatives to explain the reduction. The Task Force decided that a report describing the evolution of market and technology trends within the consumer coating industry from 1985 to 1991 be prepared and serve as a background to support its recommendations.

The Task Force met for the second time on June 29, 1993, to review the technical report and to adopt recommendations for submission to the CCME. These recommendations along with a summary of the technical report constitute the reduction plan for the purpose of initiative V101.

The main findings of the technical report, prepared by Ortech Corporation, are summarized below.

The ratio of sales of waterborne to solventborne paints has increased from roughly 45 percent in 1985 to about 60 percent in 1992. This is due to several factors, the most important of these being the improvement in performance of waterborne paints over the past several years and the ease of handling characteristics (low odour, clean-up with soap and water, rapid dry). A higher sensitivity to environmental and health issues amongst institutional specifiers has helped to contribute to increased use of waterbornes. Competition among paint manufacturers has led to wide distribution of waterborne products.

Research activities are concentrated on developing waterborne alternatives to solventborne products. Solventborne application areas that are seen as being the most difficult to find waterborne replacements for include high gloss enamels, wood stains and finishes, and floor finishes. Manufacturers stated that the market was being driven towards greater use of waterbornes.

The choice of selecting one type of coating over another is also dictated by environmental circumstances, such as temperature and humidity at the point of application. Despite the general point of view that waterborne technology will eventually dominate the architectural marketplace, there may always be a necessity for solventborne products to meet the demands posed by Canada's geography and climate.

In some areas, such as interior decorative specialities and Do-It-Yourself (DIY) wood finishes, waterborne products do not yet match solvent based coatings. The primary problems are final appearance and application properties. Equivalent finishes can be achieved with the present products; however, the application time could be almost tripled along with direct experienced effort.

The scope for further reductions in VOC emissions was estimated to be from 10 to 15 percent over ten years to as much as 30 percent over five years.

Recommendations

The following discussion and recommendations are specific to the purpose of V101 and have no bearing on other initiatives and studies.

The Task Force is of the opinion that the objective set out for V101 has already been met and that market driven forces will likely achieve another 15 to 30 percent reduction in VOC emissions over a period of 5 to 10 years..

Based on this conclusion and on a technical report prepared by Ortech International, the Task Force recommends that among the options available, (regulations, economic instruments, and voluntary actions), voluntary action be selected.

Recommendation #1: A memorandum of understanding between the coating industry and the National Air Issues Coordinating Committee (NAICC) should be developed.

The question of submitting a formal recommendation with respect to public education and initiative V202 was debated during working group meetings. Some found that it would be worth pursuing the idea. Others suggested that it would have minimal impact on this issue – "like convincing already persuaded people". It was pointed out that there is a need for public education, that the effort should be oriented towards school, and that there should be a better partnership between the industry and the government in this area. Some comments received, mainly from government organizations during the review period, pointed out the importance of the public education aspect of this initiative. They indicated that the best way to achieve further reductions in this sector would be through public education campaigns.

Many members have indicated that industry cannot continue to fulfil demands of various government bodies for inventories with an uncoordinated approach. It was proposed that the way these inventories are conducted needs to be re-assessed. Most members have indicated that all the initiatives with which they have been involved were faced with inventory problems. They submitted that inventories of emissions need to be drastically revised and that CCME should give them the highest priority. The Task Force is of the opinion that there is an urgency for a coordinated effort in the matter of inventories.

Some reviewers have insisted strongly on the need to have better and more convincing inventories, especially in areas where voluntary actions and public education are promoted. If governments were to announce that reductions have actually occurred, they should have better data to support their statements; therefore, the 1985 data base should be strengthened to back the fact that reductions have undeniably occurred.

Recommendation #2: The National Air Issues Coordinating Committee should commit itself to clarify and harmonize the various inventories undertaken by several government bodies and to strengthen their data bases.

The Task Force found that some government constraints may constitute a barrier to latex paints and suggested that by eliminating these constraints, it would be possible to further reduce VOC emissions from paints.

Recommendation #3: The Environmental Choice Program requirements should be included in Canadian General Standard Board (CGSB) standards, and the CGSB should be asked to revise their coatings specifications to make them performance standards rather than composition specifications.

Introduction and Background

Ground-level ozone, a major component of urban smog, is one of the more serious air quality problems in Canada today. In summer, more than half of all Canadians are routinely exposed to ozone levels that are known to have adverse effects on health. Ozone is also known to cause significant damage to agricultural crops and other forms of vegetation in parts of Canada.

Ground-level ozone is caused by two precursor pollutants, nitrogen oxides (NO_x) and volatile organic compounds (VOC), reacting in the atmosphere in the presence of sunlight. In recognition of the seriousness of the problem, the Canadian Council of Ministers of the Environment (CCME) decided, in October 1988, to develop a Management Plan for the control of NO_x and VOC. Phase I of the Plan, which started in the fall of 1991, contains both preventive and remedial emission reduction programs.

The paints and coatings industry consists of manufacturers of paints, varnishes, and stains. It includes two distinct subsectors - consumer and industrial - which are about equal in size in terms of value of shipments. VOC emissions resulting from the presence of solvents in surface coatings were estimated at 187.5 kilotonnes, or about 10.5 percent of total emissions, in the 1985 inventory.

Industrial coatings are used in manufacturing industries such as automotive original equipment manufacturers (OEM), major appliance, furniture, and metal fabrication. The options for reduction of VOC emissions from industrial coating operations include coating formulation changes, improvements in application techniques, and emission abatement controls. By contrast; consumer coatings do not lend themselves to control of emissions by means other than by reducing the VOC content of the coatings. It was estimated that at least 30 percent of VOC emissions from coatings would come from the consumer subsector. Because of this distinction, the CCME decided to address the reduction of VOC emissions for each of these coating subsectors under separate initiatives.

The three figures found in Appendix I illustrate the weight of the solvent category to the total quantity of VOC emitted in Canada; where the paints and coatings sector fits within the solvent category; and, finally, the contribution of the consumer subsector to the VOC emissions from the paints and coatings sector.

Initiative V101, which is one of the 31 specific VOC reduction initiatives included in Phase I, addresses the consumer coatings subsector. Its objective is "to reduce VOC emissions from consumer surface coating applications by 20 percent by 1997". The CCME recommendation with respect to this initiative states:

> " Environment Canada coordinate a task force composed of representatives from provincial governments, the coating manufacturers, and any other stakeholders to prepare an emission reduction plan, by December 31, 1993. This reduction plan would be in two parts. It would first identify the measures to be taken and a schedule that would ensure that a 20% minimum reduction is attained. The measures may include voluntary reductions, regulations, economic incentives, or other means of achieving reductions as deemed necessary. The second part of the reduction plan would target, if possible, further emission reductions on a longer time frame for inclusion in Phase II of the Plan."

In order to carry out the mandate of initiative V101, a task force composed of representatives from the coatings manufacturing industry, users, environmental groups, and federal, provincial, and regional governments was formed in the summer of 1992, holding its first meeting in September (the membership of the task force can be found in Appendix II). Presentations were made on various issues concerning reduction of VOC emissions from consumer surface coatings. Topics covered included an overview of the CCME Management Plan and initiative V101, the Environmental Protection Process, the Environmental Choice Program, economic instruments, the situation in the U.S., and the situation in the Canadian surface coatings industry.

The Canadian Paint and Coatings Association provided statistics to the task force that indicated a 30 percent reduction in VOC emissions from 1985 levels had already been achieved, citing market trends and industry initiatives to explain the reduction. To assist Environment Canada in understanding industry initiatives already undertaken, it was decided that a report describing the evolution of market and technology trends within the industry from 1985 to 1991 be prepared. Ortech Corporation developed that report.

The Task Force met for the second time on June 29, 1993. The technical report was reviewed and finalized and recommendations were agreed on. This report presents those recommendations along with a summary of the findings of the technical report and constitutes the reduction plan referred to above.

The Canadian Coatings Industry

Definitions and Scope

Consumer surface coatings are usually divided into three classes which vary by end use: trade sales, industrial maintenance, and automotive refinish.

The Paint/Coatings Dictionary[1] defines trade sales coatings as "coatings intended for on-site application to interior or exterior surfaces of residential, commercial, institutional, or industrial buildings — as opposed to industrial coatings. They are protective and decorative finishes applied and cured at ambient temperatures." They would also include Do-It-Yourself (DIY) residential maintenance applications, such as fences, and furniture refinishing.

Industrial maintenance paints are "coatings used to maintain manufacturing plants, offices, stores and other commercial structures, hospitals and nursing homes, schools and universities, government and public buildings, and both building and non-building requirements in such areas as public utilities, railroads, roads, and highways, and including industrial paint, other than the original coating, the primary function of which is protection. Residential maintenance is excluded." Industrial maintenance shares characteristics of both trade sales and industrial coating processes. The formulations, such as epoxies, urethanes, or vinyls, are often similar to those used in industrial coating operations, but the application methods are often those associated with trade sales paints, such as brushing or rolling. While trade sales paints are purchased and used by both professional painting contractors and home consumers, industrial maintenance paints are generally used only by contractors. As well, the end uses and application requirements for industrial maintenance paints are quite different from those of trade sales paints.

Automobile refinishing is usually performed in conjunction with other auto body repair. Most refinishing jobs involve the repair and repainting of a small portion of the vehicle (a panel, or a "spot" on a panel). A minority of jobs involve the overall repainting of vehicles, which is generally performed in instances of coating failure. Automotive refinishing is similar to industrial coating operations in terms of coating formulations, application techniques, and emission abatement options.

The definition of consumer coatings as covered under initiative V101 was debated at the working group meeting in September 1992. Environment Canada told the group that the rationale behind V101 was that 30 percent of all emissions occurring from coating applications did not lend themselves to "add-on" controls, and could therefore not be regulated in the same manner as industrial coatings. CPCA informed the group that the position of the industry association was that V101 was designed to target "trade sales paints" or architectural coatings and should exclude industrial maintenance.

Based on the discussions held by the task force, it was decided that initiative V101 would cover only those products which are generally considered to be trade sales, or architectural coatings, and would not cover industrial maintenance applications such as bridge, railway, and road paints.

[1]Paint/Coatings Dictionary, Federation of Societies for Coatings Technology, 1978

Structure and Performance of the Canadian Coatings Industry

The paints and coatings industry consists of manufacturers of paints, varnishes, and stains. It includes two distinct subsectors – architectural (trade sales) and industrial – which are about equal in size in terms of value of shipments. On a volume basis, however, architectural coatings account for about 60 percent of production. The architectural coatings subsector depends heavily on the performance of the construction sector, whereas industrial coatings are linked closely to the automotive, major appliance, and industrial equipment sectors.

Architectural coatings include interior and exterior house paints, primers, sealers, varnishes, and stains. They are sold to contractors and the general public through retail and wholesale outlets as well as direct to large commercial accounts. Of the retail portion, about 45 percent is sold through small hardware and decorator centres, 40 percent through large chains, and the balance through company-owned stores.

The types of coatings produced by each paint manufacturer vary over the range of end uses. Some manufacturers specialize in trade sales paints, some in industrial coatings, while some manufacture and sell both types of coatings, sometimes through separate divisions.

In 1989, the industry consisted of about 146 establishments and employed approximately 8,600 people. There is some ownership concentration in the industry. About 7 percent of the firms, each employing more than 200 people, accounted for 40 percent of the value of shipments. Conversely, there is a large number of small participants in the industry; 70 percent of the establishments employ fewer than 50 people and account for an aggregate 20 percent of the value of shipments. About two-thirds of the larger firms are foreign-controlled. Most of the smaller firms are Canadian-controlled.

In 1990, industry firms shipped goods with an estimated value over $1.6 billion. Exports totalled $33 million, representing 2 percent of shipments. Imports were valued at $238 million and accounted for 13 percent of the Canadian market.

On a regional basis, 87 percent of shipments originate in Ontario and Quebec, 12 percent in western Canada, and 1 percent in the Atlantic provinces. While most of the larger manufacturers of industrial coatings are located in southern Ontario, some of the larger architectural coatings producers have plants in several provinces. Regional manufacturers of architectural paints serve local markets across the country in competition with national firms.

During the 1981 – 1982 recession, the industry gross domestic product (GDP) dropped far below the levels that had been achieved in the 1970s. The GDP did not surpass its pre-recession levels until 1987, and it still has not surpassed the historic highs that were recorded in the late 1970s. Between 1983 and 1988, the industry GDP in constant 1986 dollars grew at a real average annual rate of 7.3 percent. However, GDP declined in 1989 and again in 1990 so, when averaged over the 1983 to 1990 period, the real average annual growth rate drops to 2.5 percent.

The paints and coatings industry serves mature markets. New coating technologies typically displace older technologies with little increase in overall demand. The performance of this industry is highly cyclical, closely following the business cycles of its major customers. The strong recovery from 1983 to 1989 reflected the general strength in all sectors of the manufacturing economy at that time, while the decline after 1989 coincided with the onset of a new recessionary period.

Between 1983 and 1990, the number of establishments remained nearly constant. Meanwhile, total employment increased in most years in order to satisfy the increased demand, indicating that the industry remains labour-intensive in nature.

International trade is predominantly with the United States. In 1990, some 92 percent of imports originated in the U.S., while 95 percent of exports were shipped to that country. Most trade activity involves specialty and industrial coatings. There is comparatively little international commerce in architectural coatings, since these lower-value products cannot support high transportation costs.

The problems faced by the Canadian industry, such as increasing raw material costs, fierce price competition for architectural coatings, and relatively low growth and profitability, are similar to those of the coatings industries in other industrialized nations.

Much of the Canadian paint industry is controlled by multi-national firms. Plants were originally established in Canada to a great extent because of the high Canadian tariffs on imported paints and coatings. Important factors affecting the competitiveness of the paints and coatings industry are the scale of manufacturing, raw material prices, and transportation costs.

Canadian manufacturers generally operate on a much smaller scale than their U.S. counterparts. Canadian batches rarely exceed 15,000 litres, whereas in the U.S. batches of 45,000 litres are common. As a result, industry productivity is lower in Canada than in the U.S.

Raw materials represent the most significant production cost, amounting to 50 percent of the value of shipments. By comparison, production labour and energy represent 7 percent and 1 percent, respectively, of the value of shipments. A number of raw materials are imported. Higher unit costs for the smaller quantities in which they are purchased, means that raw materials cost an estimated 5 percent more in Canada than in the U.S.

Transportation is another cost factor. For architectural coatings, freight can represent as much as 10 percent of the selling price. Transportation costs have made it difficult for single-plant firms with a policy of national coverage to sell profitably in competition with regional manufacturers serving local markets. Industrial coatings are usually more profitable and the effect of transportation costs on the final price is not as significant. As well, industrial coatings are often shipped in bulk to original equipment manufacturers, substantially reducing freight costs.

Technical Findings

Description of Coatings

A paint is a liquid material consisting of pigment(s) suspended in a liquid carrier containing a polymeric binder in solvent(s). Paints are applied in thin layers to surfaces for decoration and protection. The term coating is a generic term for paints and related products such as lacquers, varnishes, and stains. The terms paints and coatings are often used interchangeably.

The raw materials used in the paint manufacturing process include pigments, solvents, and resins. The chemical composition of paint varies depending on the desired paint properties. Pigments provide the coating with colour, opacity, and a degree of durability. Pigmented coatings are more weather-resistant than unpigmented paints. In the case of metal primers, pigments are used to check or inhibit corrosion of the metal. Pigments may be either organic or inorganic. Almost all of the organic pigments used today are manufactured, while inorganic pigments may be either natural or manufactured. Most natural pigments are oxides or hydroxides of iron. Manufactured pigments span the entire colour spectrum with a wide range of brilliance and opacity.

The fluid component of a coating, consisting of non-volatile binders and volatile solvents, is called the vehicle. Binders are those components which form a continuous phase, hold the pigment in the dry film, and cause it to adhere to the surface to be coated. The majority of binders in modern paint films are composed of resins and drying oils which are largely responsible for the protective and general mechanical properties of the film. Most resins and oils used in paint manufacturing are organic, although some are inorganic. Alkyds, acrylics, and vinyls are three of the more commonly used resins.

The vehicle solvents are used to keep paints in liquid form so they can be applied easily. When a coating is deposited on a substrate, the solvent should evaporate completely. It is used to transfer the pigment/binder mixture to a surface in a thin, uniform film and plays no role in film formation. Materials used as solvents include aliphatic and aromatic hydrocarbons, alcohols, esters, ketones, and esters and ether-esters of ethylene and propylene glycol. Water acts as a liquid extender and physical transfer agent, in latex paints, although these usually contain an organic cosolvent which helps to coalesce the emulsion particles and obtain a continuous polymer film.

Additives are raw materials which are added in small concentrations, from 0.2 to 10 percent. They perform a special function or impart a certain property to the coating. Additives include driers, thickeners, biocides, surfactants, dispersing agents, antifoams, and catalysts.

Products formulated with less solvent than is typically used for a particular application are referred to as high solids coatings. This generally involves changing the chemistry of the binder resin with corresponding changes in properties. Whether a particular coating formulation is considered to be high solids depends on the type of coating and its end use. Coatings which in historical terms are considered to have a high non-volatile content for a particular application may be low in solids when compared with coatings used for other applications. The term high solids must therefore be taken in context.

Trade sales paints are usually classified by the type of vehicle or carrier incorporated in the paint formulation. This classification normally refers to the volatile solvent portion of the vehicle rather than to the combined solvent and binder. The volatiles, typically water or organic solvent, evaporate after the paint has been applied to the substrate.

A wide number of products, formulated to meet a variety of service requirements, are available to the professional contractor and do-it-yourself-consumer. Advances in technology have enabled the paint manufacturer to formulate and offer both solventborne and waterborne products that are capable of meeting market requirements. Solventborne products may still be preferred or dominate certain sectors of the market for performance reasons.

Alkyd technology was developed in the 1920s. Prior to this, solventborne paints were made using oils based on natural raw materials such as linseed, hence the name oil paints. The earliest latexes, based on styrene-butadiene polymers, were developed in the 1940s. Waterborne paints were available before synthetic latexes were developed and were based on natural raw materials such as gums and casein. Developments in synthetic resins improved quality and performance.

Factors that influence the selection of paint for a particular application include expected service conditions, colour, aesthetic finish, and method of application. The consumer has a choice of either waterborne or solventborne paints for most applications.

The function of each coat is the same whether it is alkyd or latex. The selection of which to use will depend on the substrate and desired performance. Architectural paints are expected to perform on a wide variety of substrates having different chemical and physical stability.

Factors Affecting Demand

The choice of whether to use a solventborne or waterborne paint for a particular job is often determined by a perception that a certain product is better for that job. For example, the popular opinion has long been that alkyd paints have superior performance characteristics compared to latex paints. This perception had its roots in the 1950s when latex paints were introduced, and was certainly the case in the early years of latex paints. However, the last forty years have seen tremendous progress in the formulation of waterborne paints, to the point where properties are equal to or better than many of the equivalent solventborne products. Many manufacturers make the point that, ultimately, performance (or the perception of better performance) is the primary reason for choosing a particular paint.

The environmental incentive, in terms of reducing VOC emissions (not all environmental impacts are being addressed in this report[2]), to use latex paints is not yet as strong as might be hoped. Consumers who repaint their homes infrequently are more likely to choose the product which will give better performance rather than the more environmentally friendly product. The strongest determining factors remain performance, handling characteristics, and cost. Of these, handling characteristics are the most obvious benefit of waterborne paints. The perceived health benefits of using waterborne paints are beginning to play a greater role in influencing product selection.

There are several reasons that users choose latex paints over alkyds:

- Δ low odour;
- Δ ease of clean-up and disposal;
- Δ non-flammable;
- Δ rapid drying;
- Δ better performance (e.g. durability); and
- Δ more environmentally friendly.

The choice of selecting one type of coating over an other is also dictated by environmental circumstances, such as temperature and humidity at the point of application. Despite the general point of view that waterborne technology will eventually dominate the architectural marketplace, there may always be a necessity for solventborne products to meet the demands posed by Canada's geography and climate.

In some areas, such as interior decorative specialities and Do-It-Yourself (DIY) wood finishes, waterborne products do not yet match solvent based coatings. The primary problems are final appearance and application properties. Equivalent finishes can be achieved with the present products, however, the application time could be almost tripled along with direct experienced effort.

[2]For example, it was pointed out that stripping waterborne coatings for repair or refinishing puposes takes twice as long and uses more hazardous chemical removers.

Many government and institutional product specifiers depend on Canadian General Standard Board (CGSB) Qualification Listing Programs to identify suppliers of quality paints. There are CGSB specifications covering most types of trade sales paints. However, where there is a specification for both the alkyd and latex version of a product, the alkyd specification in general tends to have stricter performance requirements than those for the latex version. A specifier looking for the best performance is therefore more likely to call for the alkyd version of the product.

Evolution of Demand

The period from 1985 to the present has seen a shift in demand towards the use of waterborne paints. The volume ratio of waterborne to solventborne has increased over that time from about 45:55 to 60:40. It is estimated that this ratio is increasing at a rate of at least 1 percent per year. There are a number of reasons for this.

The performance of waterborne paints has improved markedly over the last several years. Consumers have come to accept the performance of some waterborne paints as being equivalent to that of solventborne paints. Since cost is roughly the same, users make their decision of which product to use based on handling characteristics, which are much better for waterbornes than for solventbornes.

The trade sales business is extremely competitive. Manufacturers respond to trends and new products very quickly. Any innovation is met with a flood of equivalent products within a short time. The need to be perceived as being on a par with competitors helps to explain the wide participation in the Environmental Choice Program.

While some paint dealers are owned by paint manufacturers, many are independently owned either by smaller hardware stores or chains, which may carry products from several manufacturers. As more waterborne products are developed and brought to market by competitors, manufacturers feel the pressure to supply their own versions. Each of the manufacturers carried by a dealer feels the need to supply products equivalent to those of their competitors. The evolution of demand is therefore very much market-driven. Since the direction of the market is towards greater use of waterborne products and since several manufacturers are expected to announce the availability of zero VOC latex paints soon, the number of waterborne and zero VOC products available and each manufacturer's product line will inevitably expand.

Another factor influencing the product range sold by paint dealers is the effect that the quantity of solvents kept in inventory has on insurance rates. In order to minimize insurance costs, dealers would prefer to minimize their inventory of solventborne paints and thinners, as long as they can sell waterborne products with equivalent performance properties.

Research Activities

Most of the progress in low VOC technology is driven by raw material manufacturers. The development of zero VOC latex paints has been due to developments in latex technology coming from major latex manufacturers. Individual paint companies then tailor their own formulations to the needs of the marketplace.

Most manufacturers reported that anywhere from 80 to 100 percent of their research effort goes into waterborne product development. This is in response to the requirements of the market, and the shrinking share of the market held by alkyds. Most of the research is focused on improving the properties of waterborne products which are still inferior to the corresponding solventborne product, such as high gloss enamels, varnishes, wood stains and finishes, and floor finishes. Waterborne high gloss enamels are felt to be a few years away from commercialization.

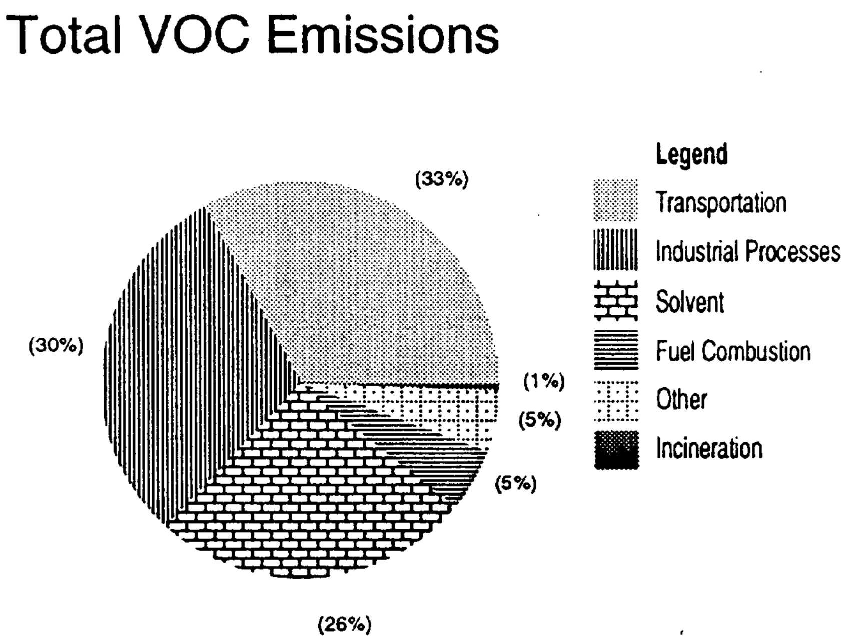
Outlook

The consensus of opinion among manufacturers is that the trend towards ever-increasing use of waterborne paints will continue. The scope for further reductions in VOC emissions without external forces (governmental guidelines or regulations) is debatable, but was estimated to be from as low as 10 to 15 percent over ten years to as much as 30 percent over five years. The feeling was that market forces are so overriding that regulations may not be required. The introduction of zero VOC paints has spurred the industry to develop equivalents in order to remain competitive, and the availability of paints virtually free of volatile chemicals is proving to be a strong attraction to some institutional specifiers in hospitals and public housing. As a full colour range for these products becomes technically feasible within the next few years, their share of the market will be further enhanced by support from the Environmental Choice Program.

Many manufacturers indicated that they believe that eventually all architectural coatings with the exception of a few specialty products will be waterborne. In the shorter term, the scope for further reductions from alkyds and specialty products is not as clear. The technological effort required to obtain low VOC alkyds with acceptable drying and application properties and the shrinking market for solventborne paints is discouraging many manufacturers from continuing research efforts.

Appendix I

VOC Emissions – Estimations Per Sector
Figure 1

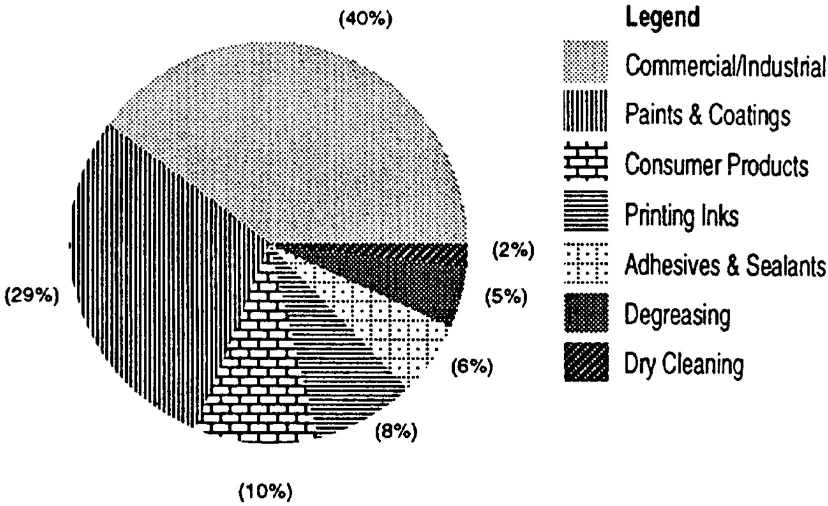


Total VOC emissions estimated at approximately 2,400 kilotonnes

Source: Environment Canada

Figure 2

Solvent Emissions

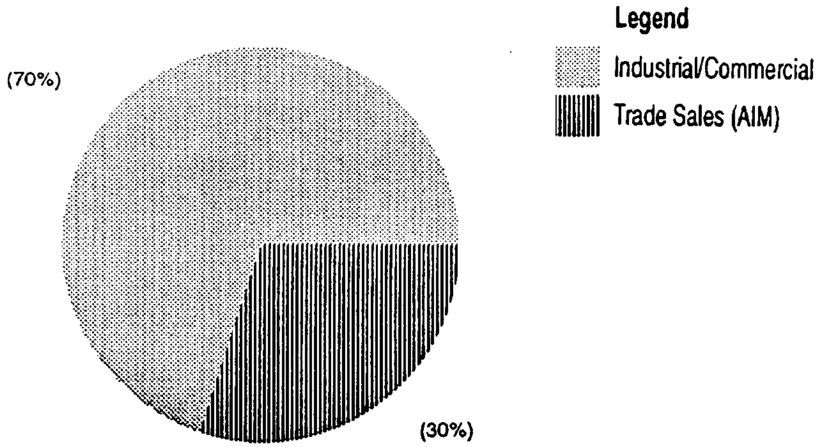


Total solvent VOC emissions estimated at approximately 650 kilotonnes

Source: Environment Canada

Figure 3

Paint Emissions



Total VOC paint emissions estimated at approximately 190 kilotonnes

Source: Environment Canada

Appendix II

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