Household Waste Paint In Manitoba: An Assessment of the Feasibility of Management Alternatives

By

Jason McMaster

A Thesis Submitted
In Partial Fulfillment
of the Requirements for the Degree
Master of Natural Resources Management

Natural Resources Institute
70 Dysart Road
The University of Manitoba
Winnipeg, Manitoba, Canada
R3T 2N2

July 1, 2003

THE UNIVERSITY OF MANITOBA

FACULTY OF GRADUATE STUDIES

*****

COPYRIGHT PERMISSION

Household Waste Paint in Manitoba: An Assessment of the Feasibility of Management Alternatives

A Thesis submitted to the Faculty of Graduate Studies of The University of

Manitoba in partial fulfillment of the requirement of the degree

of

Master of Natural Resources Management

Jason McMaster (c) 2003

Abstract

The subject of this research is the management of household waste paint in Manitoba. Proper management of this waste stream is important for a number of reasons. First, the chemical properties of household waste paint are similar to products which when used in industry are regulated as hazardous wastes, controlled products and/or dangerous goods by provincial and federal regulators. Second, because nearly all households will at some point generate waste paint, this material has the potential to become prevalent in the municipal waste stream if management controls are not in place. Both of these reasons suggest a threat to the environment, thereby making the sustainable management of household waste paint desirable for many jurisdictions including Manitoba.

In an effort to determine an optimal, sustainable method for the management of household waste paint for Manitoba, three case studies have been undertaken. The first, Manitoba, provides some contextual details and assesses whether change is necessary in the province. The second, Minnesota, is a review of a state-run program in which household waste paint is one component of a larger household hazardous waste (HHW) program. The final case study, British Columbia provides the details of how a product stewardship model has been applied to household waste paint. These jurisdictions provide a contrast in approaches and range of both financial and organizational commitment with varying degrees of success.

Based on comparative analysis of these case studies which include current best practices, this research finds that indeed, the current Manitoba system for household waste paint management requires change to eliminate unsustainable practices and the

environmental damage that results from such practices. A series of recommendations are presented for the province to move toward a sustainable management system for household waste paint. These recommendations include a transfer of responsibility for managing waste paint away from the provincial department of Conservation to the paint industry and paint consumers. Beyond this fundamental transfer, this research recognizes that provincial and local governments have a necessary role to play within a sustainable management system for Manitoba especially in the areas of education, non-program material management and integration of a waste paint management system within the existing provincial waste management framework.

Acknowledgements

I would like to thank the members of my thesis committee for their guidance and expertise but mainly for their patience throughout this (overly?) lengthy process. Specifically, thanks to Mr. Don Labossiere for taking the time to get this project off of the ground. Thanks to Dr. John Sinclair and Prof. Rudy Schilling for valuable comments on various drafts of this document and to Prof. Thomas Henley for ongoing assistance and discussion.

Ms. Angel Busch of the Natural Resources Institute, thanks for keeping me on track with my favorite part of being a student- "paperwork and administration". I know that I have caused you a disproportionate amount of work.

I would also like to thank all of the people who participated with this research by answering questions and providing much needed data. Thanks for providing assistance when you have little motivation other than to further this research. I have learned that this spirit of assistance is an important quality and hope to take this attitude forward with me into my career.

I would like to thank my family-Ralph, Sharon, Gram, Romy, Mom and Dad for an amazing amount of love and support. You put this thesis into perspective. Thanks.

Finally and most importantly, thanks and love to Jo for having the most patient, biggest heart that a person could have. You have been through this entire process and I would never have been able to do it without you

List of Abbreviations

CAP	Capital Assistance Program
CPCA	Canadian Paints and Coatings Association
CSA	Canadian Standards Association
CPV	Cooperative Purchasing Venture
ELC	Equivalent Litre Containers
HHW	Household Hazardous Waste
MARCC	Manitoba Association for Resource Recovery Corporation
MPSC	Manitoba Product Stewardship Corporation
MPSP	Manitoba Product Stewardship Program
MSDS	Material Safety Data Sheet
OEA	Office of Environmental Assistance
PLP	Processed Latex Pigment
PCA	Product Care Association
PPC	Paint and Product Care Association
RCBC	Recycling Council of British Columbia
SCORE	Select Committee on Recycling and Environment
SWMCB	Solid Waste Management Coordinating Board
SWMT	Solid Waste Management Tax
VOC	Volatile Organic Compound
WHMIS	Workplace Hazardous Materials Information System
WMA	Waste Management Act

TABLE OF CONTENTS

List of Figures

List of Tables

List of Photos

Chapter 1-Introduction

1.1 Preamble

Paints that are unwanted by households that are improperly handled, disposed or stored represent a significant threat to the environment and an inefficient use of resources and money (Personal Communication-Yee, 1999). In Manitoba, in an effort to move toward more sustainable practices, household waste paint management is under review by the provincial department of Conservation. The conclusion of this process may lead to changes in the way waste paint management is funded, the collection methods that are employed and/or, the final uses and disposal of the collected paint. The exact form that these changes should take, if any, is explored through this research.

1.2 Background

Leftover paints that are generated in private residences are the largest component, by weight and volume, other than used oil, of a waste stream commonly referred to as household hazardous waste (HHW) (B.C. Environment, 1993, Laidlaw, 1992, Hotz, 1999). HHW is defined as waste generated in private residences that is corrosive, toxic or flammable (Environment Canada, 1996). In addition to paint, HHW is comprised of pesticides, automotive products, household cleaners, and other miscellaneous hazardous products (B.C. Environment, 1990).

Currently, many jurisdictions (e.g. Manitoba) do not provide proper facilities for all homeowners to dispose of waste paint properly (Manitoba Environment, 1993, Personal Communication-Labossiere, 1999). In these cases, the following unsustainable actions occur:

- Household waste paint is disposed of through the sewer system.
- Household waste paint is disposed of in yards, fields and other natural areas.
- Household waste paint is set out at the curb with regular trash thereby entering landfills.
- Household waste paint is unnecessarily stored in basements or garages. (Manitoba Environment, 1997, Personal Communication-Yee, 1999)

These practices are unsustainable for a number of reasons. First, many paints contain hazardous materials that when disposed of improperly contaminate our land and water resources and can cause negative human health impacts. Alternately, without proper disposal facilities, improper storage of paints represents a significant fire hazard. Second, many paints (whether hazardous or not) that are currently being discarded have the potential to be re-used, recycled for re-use or re-processed for use in other applications or materials. Simply discarding this potential raw material represents a waste of resources.

1.3 Issue Statement

In Manitoba, household waste paint collection infrastructure has been insufficient to manage the volumes of household waste paint that typically could be expected to be generated by a province with a population of over 1 000 000. As a result, homeowners and others have often been forced to use one of the above four unsustainable actions when dealing with household waste paint. Taxpayers, environmental groups and local governments continue to demand changes in Manitoba in an effort to improve and

increase the waste management services available in the province for household waste paint (Personal Communication-McCormick, 1999).

Further, the relatively large volume of household waste paint generated and the potential for re-use and recycling makes household waste paint a candidate for sustainable management actions and improvements beyond other products within the HHW waste stream. By focusing on household waste paint, future changes may be more feasible from an economic, political and infrastructure perspective than if the issue of improved HHW management were to be approached as a whole. Potentially, future improvements in household waste paint management may be transferable to improvements in other HHW product management as a waste management system grows in an incremental, integrated fashion.

Overall, improvements in household waste paint management would support further progress towards waste reduction and prevention as legislated in the Manitoba Waste Reduction and Prevention Act. These improvements are also compatible with larger provincial sustainable development goals.

The alternatives for household waste paint management in Manitoba include technological changes to paint processing, collection method changes and/or changes in who will be responsible for the cost of the system that is implemented. Alternately, changes may not be feasible given the technological, economic and social parameters that currently exist in the province. The following questions regarding Manitoba's household waste paint management system exist and were addressed in this study.

1. How does the amount of household waste paint that is currently collected in Manitoba compare with the total amount that is available for collection and the amounts that are collected in other jurisdictions?
2. What happens to the household waste paint that is collected? What are the limitations that prevent sustainable use of collected household waste paint? How do these actions regarding sustainable use of household waste paint compare with other jurisdictions?
3. Who is responsible for the cost of the current disposal of household waste paint? How can funding mechanisms be arranged for household waste paint so as to promote sustainable practice? How have other jurisdictions funded household waste paint management and with what results?

The issues of collection, end-use and funding arrangements are presented separately but in reality are interrelated. Tradeoffs between technical, economic and collection parameters and factors will invariably occur. This research focuses on improvements that can be made in the management of household waste paint in Manitoba with reference to these interrelationships and tradeoffs and discusses how these improvements compare to a theoretical, sustainable management system.

1.4 Research Objectives

The primary objective of this study was to assess the feasibility of the various management alternatives that are available for household waste paint management in Manitoba. Specific objectives included:

1. To determine the components of a sustainable household waste paint management system.

2. To prepare a profile of current household waste paint volumes, collection, disposal and management in Manitoba.

3. To compare Manitoba's management system with best practices in other jurisdictions.

4. To make recommendations regarding household waste paint management in Manitoba.

1.5 Methods

To accomplish these objectives, the following methods were employed.

Objective #1: Literature review, Internet research.

Objective #2: Site visits, literature review, Internet research, interviews with key people, review of the minutes and attendance at provincial policy meetings.

Objective #3: -Site visits, literature review, Internet research, interviews with key people, review of the minutes and attendance at provincial policy meetings.

Case studies of three household waste paint management systems were undertaken and the components of these systems evaluated by comparing key performance measures. Successful components were then critically reviewed to determine applicability to the Manitoba situation. Finally, this information was used to forward a series of recommendations for improving household waste paint management in Manitoba.

1.6 Organization of the Study

Chapter 1 has provided a brief introduction to the issue of household waste paint management and the objectives of this study. Chapter 2 is a literature review that develops the issue further and reviews the theoretical components necessary for the sustainable management of household waste paint. Chapter 3 presents further details of

the methods employed to accomplish the objectives of the study. Chapter 4, titled, A Review of Household Waste Paint Management in Three Jurisdictions presents the results of the case studies-Manitoba, Minnesota and British Columbia. Chapter 5 is a comparison of these results and a discussion of how these results fit within a Manitoba context. Chapter 6 is a summary of the study and based on the previous chapters, contains recommendations for sustainable household waste paint management in Manitoba.

Chapter 2: Sustainable Management of Household Waste Paint

Chapter 2 is divided into two sections. The first section is a discussion of the waste stream under consideration-household waste paint. The second section draws upon the first to determine the components necessary for the sustainable management of this waste stream.

Section 1: Household Waste Paint

2.1.1 Introduction

The term paint, also paints and coatings, is used to describe a wide variety of complex chemical mixtures, some of which are chemically incompatible (Laidlaw, 1992). Paints are used as a decorative and/or protective coating for both indoor and outdoor surfaces (NPCA, 2001). Today, this category of products include common paint, enamels, lacquers, varnishes, undercoats, surfacers, primers, sealers, fillers and stoppers (Turner, 1980). See Appendix A for a comprehensive listing.

In an effort to define the scope of waste management programs, waste managers often employ the term consumer paint product to identify the material that becomes waste paint. Consumer paint products include all latex, oil and solvent based architectural coatings, including stains and paints, for commercial and homeowner use whether tinted or untinted. This includes paints and stains, whether colored or clear, sold in pressurized aerosol containers (B.C. Reg. 200/94 and proposed Manitoba legislation, 2000). By employing this definition, paints used in industrial and other heavy-duty applications, a significant portion of total paint sales (see Figure 1) in Canada can be discluded from

household waste paint management activities and managed using other regulatory and policy tools. Consumer paint products, then, that are no longer wanted by a user are the materials that become household waste paint.

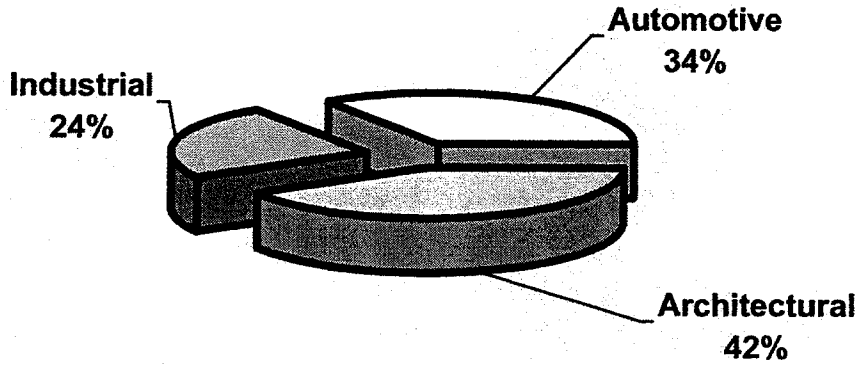


Figure 1: Estimated Dollar Sales by the Paint Industry in Canada in 1999.

Waste composition studies have almost universally included household waste paint within a waste stream known as household hazardous waste (HHW) (B.C. Environment, 1993, Laidlaw, 1992, Hotz, 1999). HHW is any unused/unwanted material in the home that may because of its chemical nature, endanger human health or contaminate the natural environment if not properly managed (Laidlaw, 1992). HHW can also be described as discarded solid or liquid materials or containers holding gases that may cause an adverse, harmful or damaging biological effect in an organism or the environment unless given special handling and treatment (Environment Canada, 2000). HHW includes all common consumer products that are corrosive, toxic, reactive or flammable (See Table 1). Currently, the CSA (Canadian Standards Association) is working, in an ongoing process, with various Canadian stakeholders to arrive at a

standard definition for HHW based on sound scientific analysis and criteria (Recycling Council of Alberta, 2001).

Table 1: HHW Product Classification.

Household Products	**Paint Products**
Cleaners.	Latex Paint.
Disinfectants.	Oil-based paints.
Floor/Furniture Polish.	Specialty Coatings.
Pool Cleaners.	Stains/Finishes.
Household Batteries.	Thinners/Solvents.
Pharmaceuticals.	Furniture Strippers.

Automobile Products	**Garden Products**
Motor oil.	Fungicides.
Antifreeze.	Herbicides.
Transmission Fluid.	Flea collars/sprays.
Brake Fluid.	Insect/rat poison.
Lead-acid batteries.	Fertilizers.

(Environment Canada, 1996)

Certainly, many paints, especially older ones fall within the broad area bounded by most chemical definitions of HHW. However, many new paints and leftover paint solids do not fall into the categories that often define and characterize HHW (Minnesota Pollution Control Agency, 2001. City of Chicago, 2001). Despite chemical content, the public often perceives all waste paint, regardless of actual composition, to be HHW. Often, differences between paint and other HHW; and between hazardous and non-hazardous paints may be difficult to determine, especially for a member of the public.

Because of these subtleties, if paint is to be managed singularly, its separation from the rest of HHW by both the public and waste managers is an administrative and

operational obstacle. The larger question of where paint fits within a broad HHW management strategy has been approached in two ways. British Columbia began managing paints as a means of jumpstarting a more comprehensive HHW management program (B.C. Environment, 2000). Presently, the original household waste paint program in B.C. has been expanded to include other solvent-based products (Personal Communication-MacDonald, 2000). Alternately, many other jurisdictions have included paint in a broader HHW program from the outset (Minnesota Department of Pollution Control, 2000).

Regardless, while the precise chemical composition of HHW is difficult to ascertain (B.C. Environment, 1990), paint is generally accepted to be the largest component of HHW not including used oil. It is estimated that between 40% (B.C. Environment, 1990) and 70% (Laidlaw, 1992) of the volume of HHW is paints. See Figure 2 for other more recent estimates.

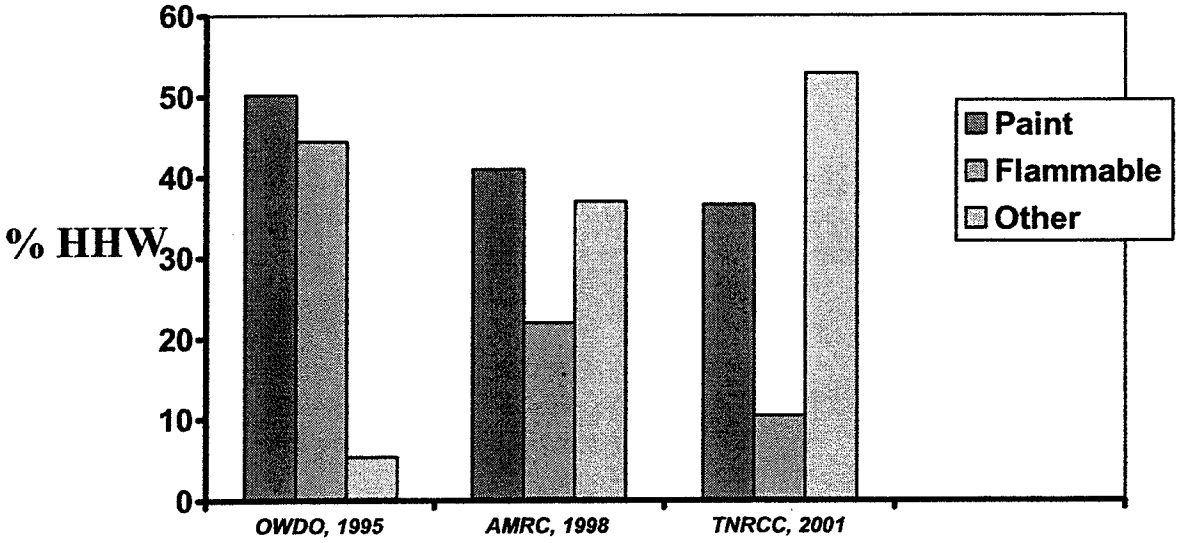


Figure 2: Estimate of the Composition of HHW by Percentage of Volume.

2.1.2 Volume of Household Waste Paint

In assessing the volume of waste paint that may be available for collection and management, both the annual amount that is generated and the total currently in storage are important to consider. Neither of these two figures are known precisely.

One B.C. study found that HHW represents approximately 1% of the total waste by weight generated by households (B.C. Environment, 1993). Other studies have estimated that HHW constitutes between .6 and .8 % of the municipal waste stream (compositional analyses by Ontario Waste Management Corporation, City of Barrie and Statistics Canada, 1995). See Table 2 for further details.

Table 2: Range of Estimates of Household Waste Paint Generation and Storage Rates.

Source	Amount HHW	Amount Paint *40% HHW*	Amount Paint *70% HHW*
Generation/household/year			
EPA, 1999	10 litres	4 litres	7 litres
Pollution Probe Foundation, 1999	20-40 litres	8-16 litres	14-28 litres
Storage /household			
Laidlaw, 1993	18 litres	7 litres	13 litres
Environment Canada,1999	11-37 litres	4-15 litres	8-26 litres

However, the figures from Table 2 suggest that an average home generates between 4 and 28 litres of waste paint/year and stores between 4 and 26 litres of waste paint.

More specific waste paint figures are available, if not conclusive. A 1991 American study estimated that there were 400 million litres of both latex and oil-based paints stored in American homes (Musick, 1991). Another study found that the average household had storage of 12 litres of paint (Garfinkel, 1994). In Canada, the CPCA (Canadian Paints and Coatings Association) has estimated that the average consumer has a waste volume of between 1/5 and 1/6 of a typical paint purchase (CPCA, 1999).

The broad range of estimates of the amount of household waste paint generated and in storage is a reflection of the uncertainty associated with this measurement. Landfill composition studies do not adequately account for waste paint in storage or

disposed of via alternative methods. Similarly, telephone surveys that attempt to ascertain waste paint volumes in households are subject to the respondent's uncertainty regarding the point at which paint ceases to be useful and becomes waste. In addition, different respondents from the same household may have a different opinion of what is waste paint and what retains value.

Regardless of the range of figures, one may conclude that household waste paint is a significant portion of the municipal waste stream. The figures provided above provide a comparative reference for actual collection totals until such time as more detailed studies become available.

Similarly, for waste paint management planning, collection results from established programs provide another tool for assessing the actual volume of household waste paint that may be eligible for a management program. In Minnesota, a planning guideline has been established that contends that every participant in a collection event will bring 10 litres of paint (Minnesota Pollution Control Agency, 1996). Similarly, it has been estimated that a collection program in an average municipality of 100 000 has the potential to collect 2 million litres of HHW per year (Canadian Paints and Coatings Association, 1999) or between 800 000 and 1 400 000 litres of household waste paint/year.

2.1.3 Hazardous Aspects of Household Waste Paint

HHW, including some paints, contain the same chemicals as those materials that are regulated in many jurisdictions, including Manitoba, as hazardous waste. By definition, the components of hazardous wastes pose a risk to human health and/or the environment. The dangerous characteristics of these chemicals include ignitability,

corrosiveness, reactivity and toxicity (Environment Canada, 1996). Special disposal techniques are necessary to make these wastes harmless or less dangerous.

Significantly different hazards are associated with the two major categories of paint- latex and oil-based products. These categories are differentiated by the type of solvent, also called the vehicle, used in formulation.

Latex	**Alkyd/oil**
Water.	Aliphatic hydrocarbon mixtures. Aromatic hydrocarbons. Alcohols. Esters. Ketones. Ethers and ether alcohols. (Ullman, 1992)

The alkyd solvents, volatile organic compounds (VOC's), are toxic, flammable and corrosive (CPCA, 1999). They have been proven to harm plant life and damage the human respiratory system (Schaleger, 1994). Depending on the concentration, symptoms after acute exposure to VOC's include respiratory tract irritation, vertigo, nausea and vomiting (CPPC, 2000). Long-term exposure has been shown to be a contributing factor to cancer, although other sources dispute this finding (Paints and Coatings, 1992).

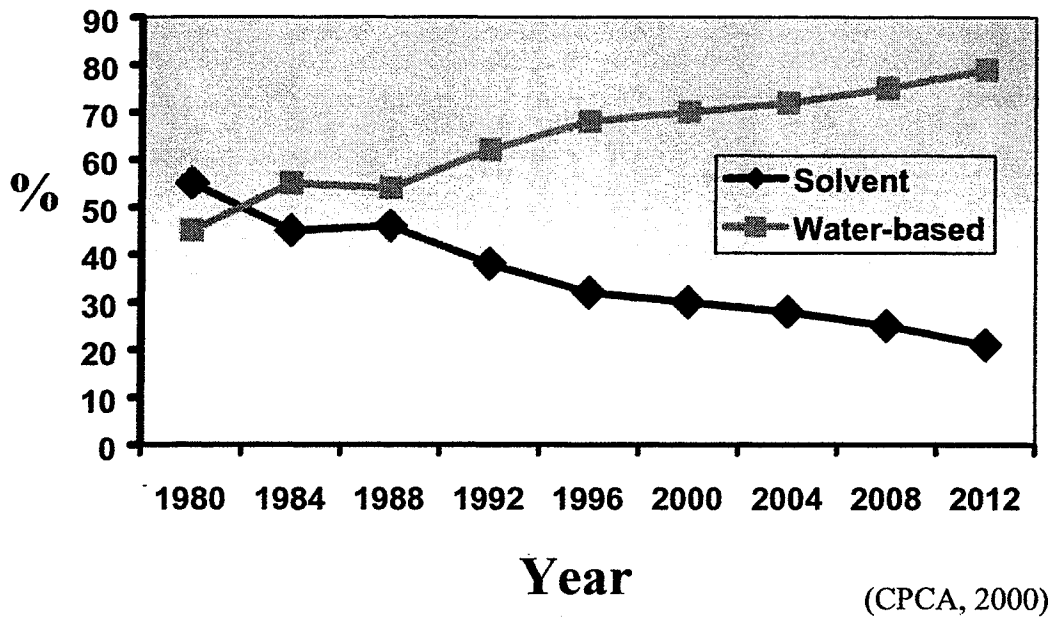
Water, hence latex paint, is a much safer, non-toxic vehicle but is not ideal for all paint applications because of its limited miscibility with other liquids necessary for paint manufacturing (Morley & Associates, 1989). The components of latex paints must be soluble in water and therefore often become permanently sensitive to water even after the product has been applied (Morley & Associates, 1989). This leaves the paint open to deterioration from weathering, the consequence of which is a preference for oil-based

paints in some cases, especially in exterior applications over previous alkyd-based applications.

Beyond the solvent, other components of a paint can be hazardous. Lead, a carcinogenic compound that has other negative health effects related to its accumulation in the body, is often a part of paint pigments in both latex and oil-based formulations. However, it has not been added to consumer interior paint since 1990. The only lead in current formulations results from naturally occurring pigments (CPCA, 1999). Currently lead can only be present in exterior applications below a level of .05%. These paints must be labeled in order to alert consumers as to the lead content (CPCA, 1999).

Mercury, another hazardous heavy metal, has been used as a fungicide in latex paints. It is still used in between 20-35% of exterior applications (CPCA, 1999). However, mercury was banned from interior use due to concern regarding its relationship to acrodymia, a rare form of childhood poisoning, in addition to concern regarding impact on the nervous system and kidney function (Schaleger, 1994).

Legal changes that limit lead and mercury content, bolstered by growing scientific evidence linking the components of paint with human health hazards, along with improved paint manufacturing technology have combined to make paint formulations much safer over the past 20 years. This trend continues with an industry-led, consumer-supported move away from hazardous oil-based products to safer, easier-to-use latex applications. The current manufacturing ratio of paint solvent types is changing rapidly. Some paint industry sources estimate that a manufacturing ratio of 90% latex: 10% alkyd will be achieved in the near future (Personal Communication-Iverson, 2000). See Figure 3.



(CPCA, 2000)

Figure 3: Manufacturing Ration of Paint Products

Regardless of these positive changes, waste managers and household waste paint management programs must be wary of the hazards associated with both new product formulations and especially of older, more hazardous products. In addition, the possibility that any paint may have been mixed with other hazardous materials such as PCB's, pesticides or other unknowns must also be considered when handling and managing household waste paint.

This section has introduced household waste paint and the issues of importance for a sustainable management system. The diversity of products that are considered household waste paint within HHW, its interrelationship with HHW, its dispersed nature (virtually all households), and chemical content contribute to the challenge that this waste

stream presents for sustainable management (B.C. Environment, 1993). The following section will discuss the components of a sustainable management system for household waste paint in light of these challenges.

Section 2- Sustainable Household Waste Paint Management:

2.2.1 Introduction

Sustainable development has been defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). Failure to consider this concept will lead to a process of environmental degradation as the resource base is depleted, wastes accumulate and natural ecological processes are impaired (Barbier, 1998). As such, one of the fundamental principles of sustainable development is waste minimization (Sustainability Manitoba, 1996). This principle requires that we endeavor to reduce, reuse, recycle and recover the products of our society (Sustainability Manitoba, 1996).

Based on these broad principles, the sustainable management of household waste paint will:

- Prevent and reduce the generation of household waste paint. This is a quantitative objective.
- Improve the quality of waste paint that is generated so that it is less harmful to the environment. This is a qualitative objective.
- Use or dispose of the household waste paint that exists in a sustainable manner.
- Maximize the reuse, recycling and recovery of household waste paint that is generated.

(Environment Canada, 1996).

A sustainable system will accomplish these objectives in a financially responsible manner; the result of which is an improvement in overall environmental quality.

To achieve this, waste paint managers must employ a combination of preventative or front-end approaches and remedial or end-of-pipe approaches. Prevention is more cost effective, socially acceptable and better able to reduce the risk to human health and the environment (Environment Canada, 1996). However, in light of the existing volume of household waste paint, a successful system must combine preventative with significant remediative techniques. This implies a range of actions from prevention at source to improving disposal conditions (OECD, 1996).

The primary goals to be pursued for household waste paint are the application of the waste management hierarchy: reduction, reuse, recycling, resource recovery and incineration. These are tools to achieve quantitative household waste paint management goals (B.C. Environment, 1991). Qualitative approaches will limit the amount of hazardous materials that are subject to the waste management hierarchy. For household waste paint, approaches focussed on limiting the generation of oil-based in favour of latex products would be considered a qualitative approach. As discussed above, this change is largely occurring based on consumer demand for latex paints over more hazardous oil-based products.

Clearly, a sustainable household waste paint management program requires a mix of objectives and approaches. For this reason, partnerships between interested parties, namely, government, consumers and the paint industry are necessary. A non-adversarial process is significant because it lends itself to the widespread acceptance of the priorities that are chosen; a prerequisite for success (Sustainability Manitoba, 1998).

2.2.2 Components of a Sustainable Household Waste Paint Management System

The following components of a sustainable household waste paint management system have been identified:

- Education.
- Safe, efficient collection.
- Use of collected paint in a manner that reflects the waste management hierarchy.
- Financial responsibility for the program that promotes sustainable behaviour and economic efficiency.

(B.C. Environment 1991, B.C. Environment 1993, Environment Canada 1996).

For household waste paint, the process of implementing and sustaining these components requires:

- Regulatory framework which creates a level playing field for involved players.
- Consultative communication processes that involve interested parties. These are used to shape and manage the household waste paint management program.

(OECD, 1996, ERRA. 1998).

The following sections will discuss each of these components separately although there are, undoubtedly, linkages.

2.2.3 Education

Education is one of the primary fundamental components of waste management (B.C. Environment, 1991). For waste paint management, education can be in the form of

information dissemination, eco-labeling, training programs and research and development initiatives (OECD, 1996).

An effective education program for household waste paint will provide the following information to households.

1. Identification of household waste paints.

A decision regarding what is and is not to be included in a management program must be made and effectively communicated to households. Education in this regard can result in less pressure on collection infrastructure and reduction in operating costs (Personal Communication-Benson, 2001). A simple approach would involve the labeling of consumer paint products which are eligible for a management program.

2. Reasons for waste minimization of household paints.

Education programs that emphasize the hazards of paint will improve participation rates in a management program (OECD, 1996). In addition, education that focuses on the benefits of household waste paint management can be used to garner public support, a crucial element for the success of any waste reduction strategy (B.C. Environment, 1991).

3. Minimization techniques for household waste paints.

Information needs to be available to promote waste minimization techniques to householders. For example, consumers should be provided with the information necessary to make environmentally sound purchases.

A common example of waste minimization education for waste paint is the B. U. D program. This program encourages consumers to-

Buy only what you need.

Use what you buy.

Dispose of that which you don't use in an environmentally acceptable manner.

Further, consumer choices such as substituting recycled paint for virgin materials, if available, and non-hazardous for hazardous paints should be promoted in the education program based on their environmental benefits (B.C. Environment, 1993). Similarly, proper disposal techniques should be clearly identified for consumers, including the logistics of collection/disposal. The time and place of collection events is important information for the overall success of waste collection programs (Donohue, 1990). Public awareness regarding collection logistics and the proximity of collection facilities to households is an important determinant of collection rates (Stubbs, 1995).

While consumer education is essential, a sustainable system will simultaneously include industrial education initiatives. Industry research and development should be fostered so that the development of environmentally sound paints can be accelerated and technical innovations in waste paint use explored (OECD, 1996). The sharing of information related to product improvements between paint companies would be ideal if not realistic (OECD, 1996). In addition, waste management employees who handle household waste paint must be properly trained in handling procedures for household waste paint to ensure safety and to maintain the value of the paint that they are handling for further use.

2.2.4 Collection of Household Waste Paint

The variety of chemical compounds that make up paints makes for a range of environmental impacts if improper disposal occurs. The exact direct, cumulative and synergistic environmental impacts of many paint products are unknown, especially in the long term (B.C. Environment, 1993). Therefore precaution is necessary.

While education is an excellent tool for the prevention of any such environmental impacts, a remedial approach that includes an efficient collection system is a necessary component of a sustainable system.

The first objective for the collection of household waste paint is to achieve collection levels that are financially and environmentally acceptable. The second objective is to collect waste paint in such a manner so that its value is maintained for further use.

Generally, the segregation and hence collection of specific parts of the waste stream (i.e. paint) involves effort on the part of the disposer; effort that they may not believe is justified by the consequences. Indeed, for all materials subject to collection, participation rates are a problem. High levels of overall environmental awareness can have positive impacts on participation rates. These points emphasize the role that an effective education program plays in improving collection rates.

While achieving an acceptable collection level, a sustainable system must be capable of handling diverse and incompatible paints so as to retain their value for re-use, re-cycling and recovery. The sorting protocol for distinguishing between appropriate and inappropriate cans of paint is the critical step in recycling latex paint-a sustainable end-use (Morley, 1989). If diverse waste paints are blended, the result is a non-recyclable

flammable sludge that has to be disposed of at a hazardous waste incineration facility (Laidlaw, 1992).

A typical sorting protocol would separate collected material into the following categories:

- Reusable paints.
- Recyclable latex paints.
- Recyclable alkyd paints.
- Non-recyclable latex paints.
- Non-recyclable alkyd paints. (CPCA, 1999)

Furthermore, the first two categories may be separated further based on their color i.e. dark and light shades. The importance of a proper paint sort emphasizes the need for sufficient infrastructure and properly trained staff.

Paint collection involves the bulking of large volumes of paint into large drums. In most jurisdictions, a large quantity of waste paint, regardless of its chemical constituents is considered a hazardous material (Donohue, 1990, Manitoba Environment, 1993). Therefore, the collection facility (including staff), the collection and segregation method and the transportation of the collected paint to its end-use must be properly undertaken so as to meet all legislative requirements (for example, Transportation of Dangerous Goods Act). These considerations are important factors from a legal/ liability perspective as well as from a general health and safety perspective for the design of collection programs.

Various collection methods have been used and/or suggested for household waste paint:

One or two-day drop off events- Participation rates for these types of events have been estimated at 3-7% (Garfinkel, 1994).

Self-contained permanent drop-off facilities- A limiting factor is that the majority of people will not drive more than 10 miles to dispose of HHW (Stubbs, 1995).

Dedicated collection services on demand (toxic taxis)- Cost and safety concerns are the major drawbacks to this method (CPCA, 1999)

Dedicated collection services on a scheduled basis- (E.g. annual or semi-annual door to door collection services)- The participation in events such as these has been estimated at 50-70 % however safety is a concern with this type of system (Farell, 1995).

Regular curbside collection (red box systems)- Both personal and environmental health and safety are significant concerns with this type of system (Personal Communication- Hodges, 1999).

Permanent mobile collection rotating through two-week visits in different locations- Suitable locations for setup are difficult to find with this system (Biocycle, 1995). In addition, infrastructure costs are high for the purchase of a collection vehicle that meets safety requirements (Farell, 1995).

Return to retailer/agent- Infrastructure must be highly developed to utilize this system. In addition, determining where paint was purchased and enforcing its return to that location is an administrative challenge.

Tradeoffs between safety, cost and collection rates are evident for all of the above options. Overall, however, the health and safety risks associated with handling and storing large quantities of household waste paint are significant enough to limit the choice of collection method to one in which the householder delivers paint to a central point, either permanent or set up for a paint drop. The alternate, curbside pickup, is dangerous and the large volumes eligible for pickup would necessitate large vehicles making multiple trips (CPCA, 1994). The likelihood of spills and similar accidents is a

reality and the leaving of unattended quantities of hazardous products at the curbside introduces concern (CPCA, 1994) (Personal Communication-MacKinnon-Peters, 1999).

The question of whether a central paint drop should be capable of handling the entire range of HHW products or focus simply on household waste paint is unclear. The benefit of such a combination is that it maximizes the use of equipment and resources that may be in place for waste management (CPCA, 1999). It also provides a one-stop method for householders to dispose of their hazardous products- convenience which may increase collection rates (CPCA, 1999). However, the combination of HHW with household waste paint collection infrastructure significantly increases the chance of contaminating the paint that is collected to the point where its value for recycling or reuse is lost (Morley, 1989) (Personal Communication-Adams, 1999), especially if staff are not adequately trained or infrastructure is not suitably designed.

2.2.5 Sustainable Use of Collected Paint

Subsequent to collection, a sustainable management system will utilize the paint that is collected in a prioritized manner that reflects the waste management hierarchy of reuse, recycling, recovery and finally incineration. Any volume of paint that is promoted within the hierarchy represents a more sustainable practice. Below is a brief description of each management option as it applies to household waste paint.

i) Paint Re-use

Paint re-use involves casual and organized trading of extra paints. Casual trading and giveaways of paint can largely be accomplished through education programs that

promote the informal exchange of waste paints. For dedicated paint exchanges, and swaps at collection sites, the overabundance of extra latex paints that are brought in must be planned for and managed appropriately (Waste Age, 1988). Organizers of reuse programs must be wary of the possibility of receiving unknown and possible hazardous materials and must be prepared to disclude this material from the exchange and/or to divulge the inherent risks in paint exchanges to users of the program. Successful paint re-use can also be accomplished through community service programs, for example, public works projects such as graffiti control or other projects where paint quality is not critical to success.

ii) Paint Recycling

Recycling is the collection and separation of materials from waste and subsequent processing to produce marketable products (South Wales Recycling Directory, 2001). With regard to paint, recycling denotes two different processes. The first processes waste paint into a paint product. The second uses collected waste latex paint to make an end product called processed latex pigment (PLP). PLP is used as filler in cements and other construction projects. The first process is more desirable because it limits the amount of new paint that is purchased and therefore limits the amount of raw material used for paint manufacturing. However, the second process is much simpler to complete and has a more stable end market, and for these reasons is more economically feasible.

Companies that have attempted to produce and market only recycled paint throughout the late 1980's and 90's have had limited success. Currently, companies in

Canada and the United States have learned from past practice and have broadened their use of waste paint to produce a mix of products which includes recycled paint of varying virgin material content and PLP (Amazon Environmental, 2001).

Paint Recycling: End Product: Paint

Using waste paint to produce a recycled paint is basically a test and blend technique (Gidney, 1992). Generally, most paint that is collected contains a small amount of filterable solids, therefore, initially, the paint must be filtered. Next, depending on the formulation, most recycled paint is mixed with virgin paint. Most recycled latex paint is at least 50 percent virgin material. However, it is available in a wide range of other percentages as well, including 100%. When virgin paint is added, it is usually white in an effort to add coloring flexibility to the final product. Further tests and additions are conducted so the final recycled product meets both color and application specifications (California Integrated Waste Management Board, 2000).

The quality and number of applications for recycled paint has improved over the 1990's. Initial recycled paint colors were limited to eggshell and a few depending on the waste paint batch used as a starting material variations (Ames, 1989). These early formulations also encountered further limitations. First, a stronger odor was noted with the recycled paints compared to new ones (Morley, 1989). Second, rolled recycled paint required heavier application to fully hide the underlying surface (Morley, 1989). Changes in the paint recycling process have improved recycled paints to the point where a high quality product may be obtained by mixing waste paint and virgin materials while suitably controlling other paint properties-principally pH and viscosity (California

Integrated Waste Management Board, 2000). Pigmentation chemistry has also improved significantly so that accurate batch matching can take place. These products may be sprayed, rolled, or brushed, just as any other paint (California Integrated Waste Management Board, 2000). Recycled latex paint formulations can now meet an increasing variety of specifications.

Despite recent improvements, however, the sensitivity and experimental nature of paint manufacturing and the variable nature of paint collected for the recycling process define the technical limits to paint recycling. The production of a uniform, repeatable, acceptable recycled paint product from household waste paint remains a challenge (CPCA, 2000). Paint recycling is highly dependent on the sorting protocol which determines the waste paint that enters the recycling process (Morley, 1989) and the laboratory tests which determine which additions must be made to a particular batch of waste paint to produce an acceptable recycled product (CPCA, 1999). In addition, one of the largest limitations of recycling for waste paint is that only latex paints, not alkyd based products, are recyclable.

Beyond the technical difficulties, many of which have been overcome, further, significant limitations prevent recycled paint from reaching the sustainable "closed loop model" portrayed in Figure 4.

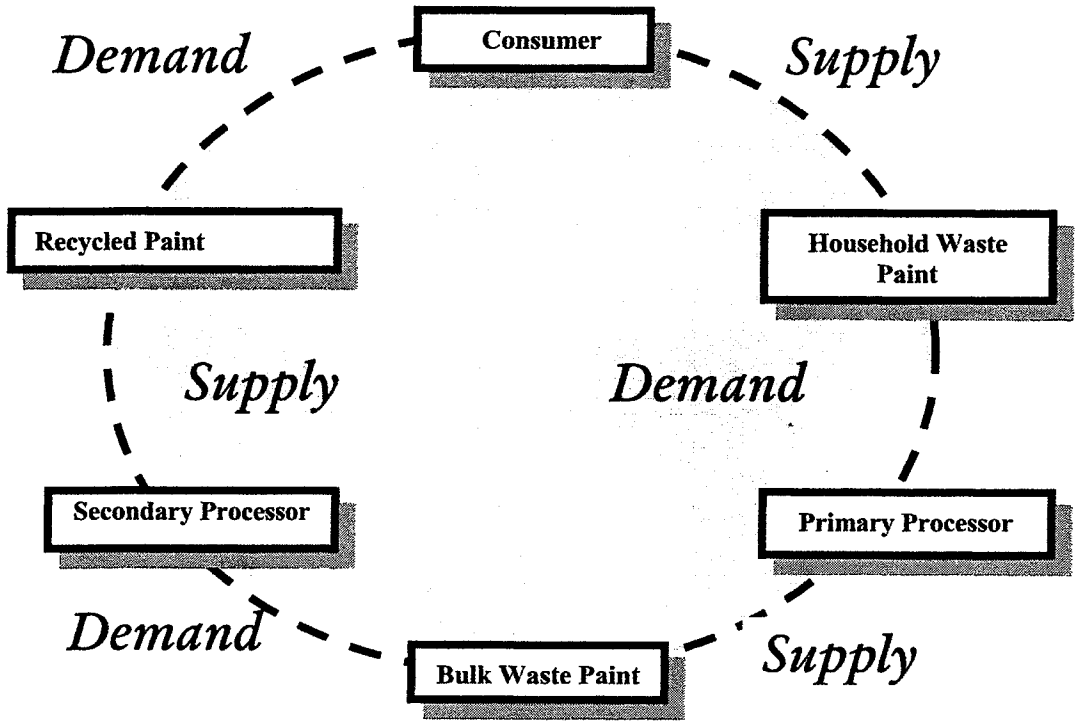


Figure 4: Closed Loop Model of Waste Paint Management.

This concept recognizes that a demand must be created for recycled materials if waste reduction is to be sustainable and economically viable (B.C. Environment, 1991). In the case of household waste paint, challenges exist in accessing the raw materials (i.e. the waste paint) and, more significantly, in creating consumer demand for the recycled product. Increasing demand for recycled paint would serve to drive the other steps in the loop, thereby "closing the loop" and making household waste paint management economically viable.

Generally, paint recycling can produce a useable, if not top-quality product (see above). The market, however, for this product is limited. Many of the market tests of

recycled paint that have been attempted have failed (Stubbs, 1994). One pilot study, which marketed recycled paint to commercial painting contractors, concluded that the test was a failure (only ½ the paint was sold) because the wrong market was pursued (Stubbs, 1994).

Similarly, the consumer market is often not ideal for two reasons, cost and the technical performance of recycled paint (CPCA, 1993). Despite improvements, the technical performance of recycled paint is a concern especially for the general consumer market (CPCA, 1993). Couple this with the fact that recycled paint has often been sold at the same price as new paint (Ames, 1989) and consumer perception of overall product quality becomes a severe limitation.

As a result, selling recycled paint to consumers demands intense marketing, especially initially. Many companies that have attempted to market recycled paints to consumers have focused primarily on the technical aspects of paint recycling when significant resources are necessary to undertake an appropriate marketing campaign to support the product (Garfinkel, 1994). Perhaps the best method for marketing recycled paint is to focus on the institutional market and from that further expand (CPCA, 1993). Municipalities could purchase recycled paint from saved disposal costs (CPCA, 1993). For a typical collection program in a group of municipalities with a population of 150 000, the total cost of collecting, recycling and disposing of post-consumer paint could be offset by the savings generated through using the paint collected in lieu of new paint (CPCA, 1999). While this statement may be a slightly optimistic view of the potential role for local governments, certainly these organizations could re-coup some of the costs

of household waste paint collection by re-using the collected product or by using paints recycled from this collection rather than new paints.

This type of preference for recycled paints by government is beneficial for two reasons. First, governments can save money otherwise spent on waste paint disposal and on the purchase of new paints. Second, by acting in a leadership capacity in purchasing and using recycled paint, governments may alleviate consumer concerns regarding the performance of recycled paints, many of which are unfounded (B.C. Product Purchasing News, 1991).

Paint Recycling: End Product: Processed Latex Pigment (PLP)

Producing lower-order products from waste paint is a much more feasible proposition given the current technical and market limitations to recycled paint. This involves driving off the solvent from the collected paints and recovering the remaining solid components. The remaining granular sand-like product (pigments, filler and resin), can be used as a filler in such products as cinder blocks and bricks (Coatings, 1992).

This is a much cheaper process than recycling to produce coatings for two reasons. First, waste paint does not need to be as closely sorted or be of such high quality to serve as a raw material in this process (Amazon Environmental, 2001). Second, because the end product does not have to meet as many color or technical requirements as recycled paint to be deemed acceptable, a much more stable market exists for these types of products (Personal Communication-Adams, 2000). Similarly, testing and chemical additions are not required to have PLP meet customer specifications.

iii) Resource Recovery

While oil-based paints can theoretically be recycled, in practice these products are more often and more practically blended with fuel oil and used as an energy source as the sole method of disposal. Oil-based paint make up the majority of the between 20%(Laidlaw, 1992) and 55% (Morley, 1989) of paint collected at trial depots that is unsuitable for recycling and re-use. Therefore, a feasible system would use solvent-based paints in re-use projects if possible, and secondly as fuel to produce energy for other processes (Personal Communication-Iverson, 2000). In essence, the energy derived from oil-based paints could be used to drive latex paint recycling.

iv) Incineration

Prior to sanitary landfilling, incineration is the final option for non-reusable, non-recyclable paints in the waste management hierarchy. This is preferable to landfilling because it reduces the volume of waste paint into an ash residue and prevents hazardous components from entering the environment. However, incineration requires emission controls to prevent air pollution and the ash residue may be sufficiently toxic to cause its own disposal problems (B.C. Environment, 1991). This process should be viewed as a final alternative to landfilling and would be the least desirable option in a household waste paint management system.

2.2.6 Cost of Waste Paint Management

The previous sections discussed the actions-education, collection and sustainable end use- necessary for a sustainable household waste paint management system. One

may conclude that given the market for recycled and reused paint, a collection program can not be financially self-sufficient. In other words, the sale of recycled paints and paints for re-use cannot cover the cost of collecting household waste paint. Therefore, sustainable end uses of collected paint can only be used to subsidize the overall cost of a management program and a simple supply-demand model cannot be used to finance collection entirely. Clearly, an alternate revenue raising tool is necessary to move toward sustainable practices for household waste paint management.

Introduction

Traditionally the responsibility for the provision of waste management services has fallen to municipal governments. The money for financing these services was raised from the municipal tax base, landfill-tipping fees and/or other revenue sources. HHW management was often included in this municipally driven waste management arrangement. Local governments offered HHW collection events if they could afford them and if the demand for such an event was deemed sufficient. Provincial governments were involved in a regulatory role and to provide technical and infrastructure assistance. Because of the high costs involved, this type of arrangement often provided an inadequate level of service, the result of which was a general decline in local environmental quality (Personal Communication-Fernandes, 1999.).

In many instances with little or no household waste paint management services, waste paint ended up in landfills, thereby increasing the liability of municipalities for the cost of landfill remediation (Personal Communication-Fernandes, 1999). In these cases, because landfill tipping fees do not reflect the "true costs" of paint disposal, including

these remediation costs (B.C. Environment, 1991), it became cheaper for disposers to send paint to a landfill than to pursue other, environmentally safer disposal options. This arrangement resulted in either a large, unsupported cost to municipalities to maintain environmental quality or degradation in the local environment.

This type of traditional arrangement for HHW management has remained in many jurisdictions including municipalities in Ontario (Regional Municipality of York, 2001 and in a many counties in the United States (e.g. New Jersey, Minnesota and Pennsylvania). However, in light of degrading environmental quality and increasing costs, a number of jurisdictions have changed or are considering alternate arrangements for HHW management. This change, in many cases, involves a shift in responsibility for waste management away from government institutions to the parties who are responsible for waste generation- principally the industry that produced the product under consideration and to the consumers who derived benefit from the product.

An early example of such a shift in responsibility occurred in 1991 when Germany adopted a law making producers responsible for post-consumer product packaging. To comply with this law, a non-profit third-party organization called Duales System Deutschland (DSD) was formed to be responsible for the collection and recycling of packaging waste throughout Germany. The system is funded through industry licensing fees rather than through government revenues (Institute for Local Self-Reliance, 2001). Subsequently, stewardship programs have been developed for waste streams such as tires, oil, batteries, bottles, medications, packaging, plastic bags and proposed for electronic wastes, carpets and end-of-life vehicles in various Canadian, European and Asian jurisdictions (Institute for Local Self-Reliance, 2001).

The concept of transferring responsibility for waste management to those who derive benefit from a product- product stewardship-attempts to promote sustainable waste management by providing financial incentive for industry and consumers to change from actions which are damaging to the environment to more sustainable alternatives.

2.2.7 Product stewardship

The concept of product stewardship has grown from public and government interest in an alternate approach in dealing not only with the waste materials of our society but also in providing funding mechanisms to properly manage them (Holmes, 1999). A broad definition of stewardship involves the desire that all those who benefit from products are to be held responsible for their management (Holmes, 1999). Product stewardship is achieved when the pollution caused by a particular product is eliminated or managed in an environmentally responsible manner and the resulting costs are paid for by the producers and consumers of that product.

In effect, product stewardship enforces the widely accepted concept of "polluter pays" by holding those who derive benefit from a product responsible for not only the pollution caused during its production but also for pollution caused after its purchase (Environment Canada, 1996). This type of life-cycle view of a product involves looking at the entire chain of activities in the life of a product from raw material sourcing through fabrication, transportation, use, re-use, recycling and final disposal to determine the true cost of the product (Environment Canada, 1996). Traditionally, the cost of products in the marketplace has only reflected the cost involved in creating and selling that product- steps from raw material sourcing to transportation and marketing (i.e. the first part of the life cycle). Product stewardship recognizes that other costs are associated with products

including the cost of use (e.g. pollution clean-up) on through final disposal (e.g. waste collection). All of these life-cycle costs should be included in the cost of a product. Three essential elements of product stewardship are as follows:

- Take-back obligations for stewards.
- Waste prevention obligations for stewards.
- Life-cycle analysis reporting obligation.

(Sinclair, 1996)

Product stewardship programs that do not involve these elements will be incomplete. For instance, if no waste prevention standards are in place, and hence waste reduction activities are not occurring, the product stewardship program becomes a simple revenue raising tool rather than a tool that affects positive changes toward sustainable practice in consumer and industry behavior . The DSD system in Germany has been provided with legally mandated recycling targets of between 60-75% depending on the packaging material in an effort to prevent waste. By 2002, these targets have been met for all materials and it has been estimated that 1.5 million fewer tons of packaging which prior to 1991 would have been waste is currently on the German market (Resources for the Future, 2002).

In order to implement the essential elements of stewardship, three policy vehicles have been identified:

- Transfer of take-back obligations to stewards.
- Levy fees. These should reflect both the management cost and environmental costs of a product.
- International standards for life-cycle analysis.

(Sinclair, 1996)

The following is a discussion of each policy vehicle as it applies to household waste paint management.

i) Take Back Obligations

The first policy vehicle, the transfer of take-back obligations to those who derive benefit from a product, is a relatively straightforward concept, in theory. In practice however, it may be difficult. This transfer may require legislative action that may not be favorable from a political perspective.

The Manitoba Packaging Stewardship Program (MPSP), a program whose goal is to manage packaging waste in Manitoba has failed to fully transfer take-back obligations to the stewards identified by the program (Holmes, 1999). The extent of the obligation to stewards under this program is the payment of beverage container levies by consumers. Registered distributors in the program simply remit this collected levy on a monthly or quarterly basis to the Manitoba Product Stewardship Corporation (MPSC) which then uses these funds to support recycling programs across the province. The lack of full and meaningful transfer of take-back obligation to identified stewards is a contributing factor to the program's lack of progress toward sustainable behavior changes. For example, little sustainable change has been made by those involved in the chain of goods prior to the point-of-sale and consumers continue to make product choices based solely on preference rather than considering environmental impacts.

The remedial nature of the MPSP is also apparent in Manitoba's used tire stewardship program. This program has been an extremely successful example of how a

stewardship program can be used to divert waste products from landfills. The program was initiated in 1995 and is supported by a three dollar tire levy that is assessed on the purchase of new tires in Manitoba by over 900 automobile dealerships and tire retailers (Manitoba Product Stewardship, 2000). By the year 2000, over 7 million tires had been recycled into products such as truck box liners and skating rink waiting room mats (Manitoba Product Stewardship, 2000). The program has been successful in removing tires from landfills and in eliminating tire stockpiles around the province. However, while it may be difficult, the program has had less success in reducing the amount of waste tires that are subject to further processing.

ii) Levy Fees

The second policy vehicle necessary for the implementation of the essential elements of product stewardship is the use of levy fees that reflect both the management and environmental costs of a waste product. For waste paint, latex and oil-based products incur similar management costs (Product Care Association, 2000). Therefore, reflecting this management cost in a levy is feasible.

It is, however, much more difficult to implement a levy fee that reflects the environmental costs of paint disposal. This is related to the administrative complexity involved in monitoring the chemical content of every product and a significant lack of scientific certainty regarding the exact environmental costs associated with the entire range of paint products. The DSD packaging system in Germany has seen some progress in linking environmental cost with the levy fee assessed on a packaging material. The license fee for glass is $.04/pound versus $.69/pound for plastic and most German studies

report favorable material substitution away from plastics towards materials such as glass that have a lower license fee (Resources for the Future, 2002).

For paint, a simple differential levy between latex and alkyd based products is a starting point. Clearly, latex paints are more environmentally friendly than oil-based products and can often be directly substituted for oil-based paints. Therefore, a differential levy based on the type of solvent would theoretically promote greater latex purchasing by consumers and therefore less production of alkyd products by industry.

It can be argued that the paint industry is already preferably producing latex paints without the implementation of a differential levy (see above). However, a differential levy based on the volume of the container and the product contained therein may still be beneficial to further accelerate the production rate of environmentally friendly paints.

The MPSP has encountered difficulty regarding the equitable application of its levy as it pertains to the above discussion. The two-cent levy on beverage containers is not based on the environmental cost of the container (i.e the same levy applies regardless of type or amount of material in the container) and, in addition, is in some cases not visible to consumers (Holmes, 1999). In addition, because the levy has not been treated as an internal cost to the producers in the program but rather as a simple additional cost, sustainable practices are not properly signaled to consumers and industry. As such, the levy functions in essence as a revenue raising tool that is collected by a body other than government.

The revenue generated from this levy is then used to finance the recycling of not only beverage containers but also other PET bottles, aluminum, glass, steel containers

and newspapers. Therefore, consumers and distributors of beverage containers are supporting the cost of recycling of other materials. This type of inequitable situation is conceivable for HHW management. A levy on paint which finances an entire HHW program would face similar problems as the MPSP has encountered. In such a situation, the purchase and use of dangerous chemicals, some a lot more hazardous than paint, would not be reduced and may even be encouraged given the possibility of a free, safe disposal system paid for by a levy placed on less hazardous but more prevalent paint products.

iii) Life-Cycle Analysis

The third policy vehicle used to implement product stewardship programs, the development of international standards of life-cycle analysis, is also limited by scientific knowledge. Agreement regarding the impact that one product has on the environment over its life span is difficult to obtain even among experts.

Life-cycle analysis is also limited by regional differences in waste management policies that hinder efforts in harmonization and create inequities in environmental industries between jurisdictions. The Manitoba used oil stewardship program-Manitoba Association for Resource Recovery (MARCC)-has been successful in partnering with other provinces in Western Canada to provide a consistent approach to used oil management across this part of the country. Paint stewardship programs in Manitoba should follow this example of working regionally to provide a consistent, integrated approach to waste paint management and a level playing field between governmental units.

Regardless, the implementation of such a product stewardship program for paint is accompanied by concern that consumers will be forced to "cross-border" shop to jurisdictions that do not have a product stewardship program (i.e. product levy) in place (per. Comm., 1999). These concerns can be alleviated by harmonizing the approach taken to management from a local to provincial to national to international level (OECD, 1996).

In summary, the implementation of a paint stewardship program will be beneficial for waste paint management in two ways:

1. It can act to place responsibility clearly on a certain party or parties, a preferable situation for waste management (OECD, 1996). Similarly, it can act as an economic tool which educates and motivates consumers and industry to facilitate changes to more sustainable practices such as waste paint reduction and environmentally friendly purchase choices.

2. It can act to finance the cost of household waste paint management.

2.2.8 Legislation

The implementation and operation of a sustainable household waste paint management system with a product stewardship component is dependent on a legislative and public policy framework that promotes sustainable practices and ensures the equitable participation of involved parties. This may involve a change in traditional command and control arrangements to other arrangements that require greater flexibility on the part of government institutions (Personal Communication-Maxwell, 2000). This flexibility may include the legislated acceptance of input into waste management from those industries involved in generating a waste stream. Government must accept that

within the proper legislative framework, industry and public institutions may have complementary rather than antagonistic goals.

With regard to a proper legislative framework, for example, a product stewardship system is most successful if a level playing field is assured (B.C. Environment, 1999). This can be achieved through consultative, voluntary processes; however, it is likely that "backdrop" regulations that outline performance requirements such as collection and recycling rates with penalties for companies who choose not to participate in the management program are necessary (OECD, 1996). As an example, Quebec has legislated that all companies will have to setup their own recovery and recycling system for household waste paint. The regulation exempts any company that agrees to work within an organization whose function is to develop, set-up, administer and fund a system for post-consumer paint management (Canadian Environmental Regulation and Compliance News, 1999).

Legislation can also be used as a punitive measure to directly encourage sustainable practices. For example, some jurisdictions have banned paint from landfills (Nova Scotia Environment, 1999) in order to kick-start more sustainable practices. This however, may not be suitable in all cases. A jurisdiction must be alert to the practicalities of enforcement of such measures otherwise the result may be illegal dumping with resultant environmental damage (OECD, 1996).

In many cases, legislation not only does not promote but is a significant barrier to sustainable practices (Canadian Environmental Industry Association, 1994). For instance, Health Canada has proposed a revision to its liquid coatings regulations that would set the acceptable level of lead contained in paint at .06% and mercury at 10 parts

per million. The new levels do not appear to be a problem for new paint but could present significant difficulties for products that are being recycled (Canadian Environmental Regulation and Compliance News, 1999). Governments need to remove legislated barriers such as these that discourage sustainable practice while at the same time creating a regulatory environment that encourages sustainable waste management practices.

Another example of a legislated barrier is the concern regarding the requirements that recycled paint must meet under WHMIS (Workplace Hazardous Material Information System) regulations. WHMIS requires that the level of heavy metals and other controlled products that might be expected to be reasonably found in paint, must be ascertained in order that appropriate Material Safety Data Sheets (MSDS) may be generated (CPCA, 1999). While this is possible, expensive laboratory tests are necessary, thereby elevating the cost of the recycled paint substantially and further decreasing the competitiveness of recycled paint with new products (Laidlaw, 1992).

2.9 Shared Responsibility

Beyond legislative action, the implementation and ongoing maintenance of a sustainable household waste paint management system requires significant communication and cooperation between the major players involved. The concept of shared responsibility whereby all participants in the supply chain, from production to consumption, accept responsibility for the environmental impacts occurring in their specific part of the chain (ERRA, 1998) is a model increasingly being applied to waste management. A further definition contends that all those who derive benefit from a product are to be held responsible for the management of waste associated with that

product. Those responsible include consumers, governments and the producers of the product (Holmes, 1999). Melding these parties together in an open process sets the stage for a more successful program in which policies and procedures are accepted and implemented and decisions coordinated so that up-stream actions in a product's life cycle do not result in unsustainable actions at some later point. Indeed, The U.S. Presidential Committee on Sustainable Development has recognized that decisions made up-stream in a products life cycle can reduce or eliminate pollution caused earlier in that products life cycle (PCSD, 1998).

Shared responsibility implies the necessity for all parties involved to consult and coordinate their efforts so that resources can be better managed, pollution can be better monitored and controlled, environmental policies, regulations and research can be better coordinated, and laws better enforced (Sustainability Manitoba, 1996). The following is a broad summary of the responsibilities of three major players in household waste paint management.

	Responsibilities
Industry	Take responsibility for the environmental impacts of its products.
	Inform consumers about the environmental aspects of its products.
Consumers	Stay informed.
	Accept responsibility for the environmental impacts of the products that are purchased.
Government	Create a level playing field.

Remove regulatory barriers to sustainable practices.

Set an example (procurement policies).

These are broad responsibilities that require on-going assessment, clarification and management to ensure that a waste management program is performing adequately. As such, communication between these parties is fundamental to the set-up and continuing management of the day-to-day operational actions of a program in addition to providing long-term guidance and direction for a sustainable management of household waste paint.

Chapter 2 has identified the following components of a sustainable household waste paint management system:

- Education.
- Safe, efficient collection.
- Use of collected paint in a manner that reflects the waste management hierarchy.
- Financial responsibility for the program based on the concept of product stewardship.

For waste paint, the process of implementing and sustaining these components requires a:

- Regulatory framework.
- Consultative processes between interested parties.

Further study of how and with what effectiveness these components have been implemented for household waste paint management in three case studies is the focus of the following chapters.

Chapter 3: Methods

3.1 Introduction

An assessment of the feasibility of alternatives for household waste paint management in Manitoba required three major components.

1. A description of the components of a sustainable household waste paint management system. In Chapter 2, these components were identified as:
    - Education.
    - Safe, efficient collection.
    - Use of collected paint in a manner that reflects the waste management hierarchy.
    - Financial responsibility for the program based on the concept of product stewardship.

For household waste paint, the process of implementing and sustaining these components requires a:

- Regulatory framework.
- Consultative processes between interested parties.

2. A profile of Manitoba's current household waste paint management system to act as a baseline and provide context for further analysis. See below, section 3.2
3. Case studies of household waste paint management in other jurisdictions to determine best practices and unsuccessful actions and programs. See below, section 3.3

Data collected from these case studies were then compared to provide the basis for recommendations for improvement to the current Manitoba arrangement for household waste paint management.

The following sections are further discussion of the methods that were employed in this research.

3.2 Household Waste Paint Profile of Manitoba

The current volumes, types and distribution of household waste paint in Manitoba have previously been estimated. Further clarification of these values and the method by which that paint is used and/or disposed of in the province was determined.

The determination of the volumes and types of household waste paint in Manitoba was accomplished through interviews with waste managers regarding paint collection rates. The capture rate of Manitoba collection infrastructure, along with the capture rate of the case studies was determined by dividing the amount of paint collected by the number of households in the jurisdiction multiplied by the amount of waste paint generated per household.

Other elements of the management system, including infrastructure, end-use, funding arrangements and others were researched through interviews with key people in the Manitoba Department of Conservation, the Manitoba paint industry, Manitoba consumer groups and the Manitoba waste management industry. Site visits to HHW collection events and facilities and attendance at provincial HHW policy meetings provided valuable sources of information for the profile.

3.3 Case Studies

By studying the waste paint management programs of other jurisdictions, implementation methods were observed and practical operational limitations studied. The strengths and weaknesses of household waste paint management programs in other jurisdictions were identified to recommend changes to the Manitoba situation.

This study focused on British Columbia and Minnesota. Both have significant, committed, waste management systems that collect household waste paint but are sufficiently different to provide a contrast in approach. The major contrast between B.C. and Minnesota (public vs. industry involvement/responsibility) is valuable to this study because it provides two fundamentally different methods and responsible parties for managing household waste paint.

In British Columbia, the non-profit BC Paint Care Association (PCA later changed to PPC) was formed in 1995 to manage the paint stewardship program in the province. The main goal of the program is to provide consumers with an easily accessible means of returning leftover paint with no disposal charge. The program incorporates the principles of pollution prevention by promoting progressive movement from treatment and disposal of paints to energy recovery and reuse (B.C. Environment, 1999). Because this is the first program of its kind in Canada specifically directed toward household waste paint, this case study provides a view of the positive and negative aspects of a household waste paint management program over a significant life span-from start-up through operation and maturity. Other provinces, specifically Quebec in 2001 and Nova Scotia in 2002, have started programs similar to the B.C. program but are only in the initial stages of work in the area of household waste paint management.

The information garnered from interviews with key people in B.C. (PPC, retailers, City of Vancouver, environmental groups, Province of B.C.), literature related to this operation and a site visit to a household waste paint collection and bulking facility in B.C. provided a profile of household waste paint management in the province.

Conversely, Minnesota is a government-run program that is supported by tax revenue. Minnesota has committed significant financial and administrative resources to the problem of waste management, specifically HHW, over the past decade. Minnesota has committed significant financial and administrative resources to the problem of waste management, specifically HHW, over the past decade. For example, the Minnesota Pollution Control Agency has a Household Hazardous Waste unit. The staff in this unit provide technical and administrative assistance in the areas of HHW program design and development, HHW facility operation, administration of contracts for household hazardous waste management, and staff training and development for HHW managers. This program guides counties in offering collection and disposal options for household waste paint to Minnesotans. The study of Minnesota provides information and areas where government involvement is beneficial to the success of a household waste paint management program and areas where public involvement hinders the success of a program.

Because of funding limitations, a site visit to Minnesota was not possible. However, interviews with key people and literature reviews were pursued to provide collection results and the necessary information to analyze the Minnesota situation.

As in many environmental areas, the management of household waste paint is changing rapidly, therefore the information contained in the results section specific to the case studies is current only as of 2002.

3.4 Comparison and Plan

The analysis of the Manitoba, B.C. and Minnesota household waste paint management systems is based on the theoretical components of a sustainable management system identified in Chapter 2.

Further, the assessment of the current Manitoba situation and the case studies requires first, the determination of how many of the sustainable components are in place in each jurisdiction and, second, comparative, performance measures to determine how successful the implementation of these components has been. For example, one case may have fully developed collection infrastructure (component) but a low collection rate (performance measure).

Performance measures were used to critically review each program were derived from the literature review, Chapter 2, and are as follows:

	Measure
Education	Media. Point of contact. Content. Target. Accountability.
Collection	Collection type. Collection rate. Collection targets.

End-use	Reduction rate. Re-use rate. Recycling rate. Recovery targets.
Financial Responsibility	Cost effectiveness.

For the other components discussed in Chapter 2- financial responsibility for the program based on the concept of product stewardship, a regulatory framework and consultative processes- distinct performance measures are more subtle and are related to the arrangements between interested parties. These arrangements were critically reviewed in light of the fact that unsustainable arrangements will impact the performance based measures identified above. In other words, the root management arrangements were identified and compared with information gathered in Chapter 2 (e.g. responsibilities of interested parties). This identified arrangements that fostered positive performance measures and those that had a negative impact on the performance of the program under study.

Through this entire analysis, a series of best practices were determined that were compared to current Manitoba practice. When a gap was identified, possible solutions were then brought into a Manitoba context by reviewing with key local players. This type of gap analysis suggested the direction that Manitoba should pursue to improve household waste paint management. Toward this, Chapter 4 presents the data obtained in the research; Chapter 5 presents a comparison and analysis of this data and finally Chapter 6 draws on the previous chapters to present conclusions and recommendations for changes to the current Manitoba household waste paint management system.

Chapter 4- A Review of Household Waste Paint Management in Three Jurisdictions

4.1 Manitoba

4.1.1 Introduction

In 2001-2002, in Manitoba, household waste paint was collected as part of a provincially funded HHW management program. The province contracted with a private company, Miller Environmental, to provide HHW services at one permanent site in south Winnipeg (See Photos 1-3) and at a series of one-day, mobile collection events throughout rural Manitoba. A similar level of service has been available to Manitobans throughout the 1990's. A service which, according to both Miller and municipal waste managers, the public has grown familiar with over the past decade (Personal Communication-Moore, 2000).

In Winnipeg, collection events are held twice per month from April to September and once per month throughout the rest of the year. In the year 2000, rural one-day collection events were held in Winkler, Selkirk, Brandon (twice), Pinawa, Lac Du Bonnet, Portage La Prairie, Dauphin, Flin Flon, Thompson, The Pas and Swan River.

Photo 1: Miller HHW Collection Event in South Winnipeg.

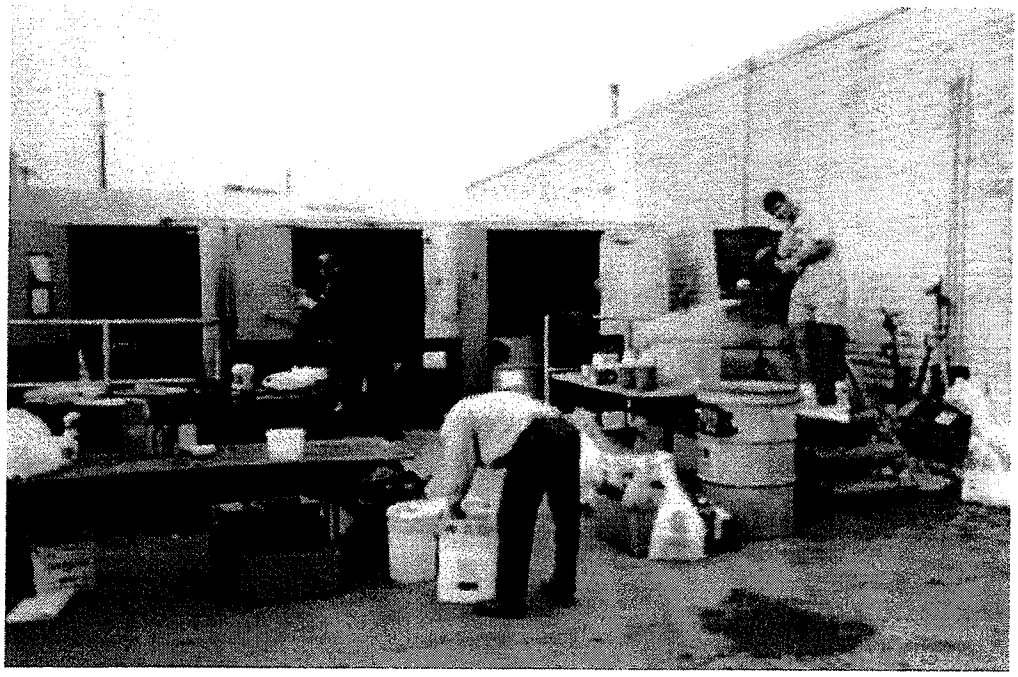


Photo 2: Paint Separation at Miller HHW Collection.

Photo 3: Lineup for Miller HHW Collection.

In 1999-2000, the HHW collection program cost the province $420 000. Paints made up approximately 70% of the total HHW collected by the company. A total of 279 222 equivalent litres of waste paint was collected. In 2000-2001, similar costs and collection rates were projected (See Table 3).

Table 3: Manitoba Household Waste Paint Collection.

Year	Paint (ELC)	Cost ($)
2000	280 000	420 000
2001	295 000	420 000

Manitoba Conservation estimates that these collection rates represents 15-20% of the annual amount of household waste paint generated in the province. Miller Environmental

estimates that the program is utilized by approximately 1% of the households in the province (Personal Communication-Edmonds, 2000).

At the point of collection, Miller separates paint from other HHW. In the past, all paints collected by Miller were sent to the United States to be fuel-blended in cement kilns. In an effort to reduce costs, late in the year 2000, Miller implemented a process whereby latex paints (60% of the paint collected by volume) are reduced to a solid residue and disposed of at the City of Winnipeg's sanitary landfill. Oil-based paints continue to be shipped out of province for use in fuel-blending operations (Personal Communication-Edmonds, 2001).

Prior to the separation and processing of collected paint, participants in Miller collection events are free to take away any product they wish, however, no organized re-use program is underway. In the past, Miller supplied paints for re-use to the Habitat Re-Store in Winnipeg with limited success. The Re-Store encountered difficulty in selling these paints and ended up using Miller to dispose of the vast majority of these original products plus paints donated from other sources. In short, Miller was disposing of more paints from the Re-Store than it was donating.

Currently, the Re-Store receives paints intended for re-use, mainly from homeowners, and attempts to sell them at a low cost. This is a relatively minor operation compared to the volumes of paint handled by Miller or to those paints that are in storage or disposed of improperly in the province. Similarly, some municipalities also have re-use events but once again, these are of a relatively small scale.

Specific household waste paint and even general HHW education in the province is not especially intensive. Municipalities often advertise HHW collection dates and

locations in local newspapers, on local radio or through inserts in utility statements in some cases. In Winnipeg, the Miller collection infrastructure is operating at or near capacity, even with minimal advertisement as to the availability of services. Other organizations are involved in general environmental education including the Manitoba Product Stewardship Corporation, Resource Conservation Manitoba, the City of Winnipeg and others, however, no campaign focussing strictly on HHW nor on household waste paint has been undertaken.

4.2 Minnesota

4.2.1 Introduction

In Minnesota, household waste paint constitutes a significant portion of the waste stream managed by the Minnesota Household Hazardous Waste Program. This program is a partnership between the state-run Minnesota Pollution Control Agency (MPCA) and Minnesota's 87 local governments (86 counties and 1 regional district).

The objectives of the Minnesota Household Hazardous Waste Program are:

- To protect the environment by reducing the amount and toxicity of pollutants released.
- To improve the health and safety of people in their homes by providing education on how to purchase, use and store household chemical products.
- To protect workers and waste-management facilities from adverse impacts of discarded household chemicals.
- To reduce the long-term cost of emission controls and residual treatment for waste-processing facilities.
- To provide proper management for unwanted products.

(MPCA, 2001)

The program provides education regarding HHW purchase, use, storage and disposal, and operates a network of regional, local and mobile facilities to collect and dispose of HHW, including household waste paint (See Figure 5).

The current form of the program stems from the incorporation of the recommendations of the Governor's Select Committee on Recycling and the Environment into Minnesota law that were put forth in 1989. This set of laws, commonly referred to as SCORE, is a part of the Minnesota Waste Management Act (WMA). The following are the fundamental elements of SCORE:

- Source reduction.
- Recycling.
- Municipal solid waste management.
- Yard waste.
- Composting.
- Education.
- Problem materials and HHW management.
- Litter abatement.

SCORE legislates for the use of the state's solid waste management tax to assist state and local programs that deal with these major waste management elements.

For HHW, these funds are administered by the MPCA and are used to supplement county expenditures in two ways. First, the MPCA provides SCORE grants directly to counties to assist with HHW management. Counties can then opt to contract HHW services through the private and nonprofit sectors, provide grants or direct payment to cities and townships, form joint powers with other counties to fund regional efforts, and/or use county staff to develop and provide services. Generally, Metropolitan Area counties (i.e. Minneapolis-St. Paul area) have utilized SCORE grants to fund local

government in an effort to spur waste management activities. Rural Minnesota counties have tended to run programs themselves or contract for private services. More and more counties throughout the state are relying upon joint powers agreements for the efficient delivery of HHW programs.

In addition to SCORE funding, counties may receive financial assistance for household waste paint management from a number of other state agencies. Capital Assistance Program (CAP) grants are available for HHW infrastructure. The Minnesota Office of Environmental Assistance (OEA) also has a number of targeted grants, some of which focus on waste management activities. For example, in 2000, the targeted round of OEA grants called for proposals that improve waste paint management and/or programs that initiate product stewardship activities.

The second method by which the MPCA contributes to HHW funding is through direct funding for management costs associated with statewide HHW activities. These include the administration of statewide contracts for HHW transportation and disposal that individual counties may or may not choose to participate in and state-wide HHW education programs.

Beyond these significant financial contributions, Minnesota counties receive technical support from MPCA staff in HHW program design and development, facility operation and staff training so that program consistency is maintained state-wide.

4.2.2 Collection Results

In 1999, 86 of Minnesota's 87 local governments were involved in some form of household waste paint collection. Seventy-eight counties either operated or cooperated in a permanent collection facility. See Figure 5. The remaining counties offered a

combined total of 34 one-day collection events. Only one county, Mille de Lacs, provided no HHW collection service, either one-day or permanent, to its citizens

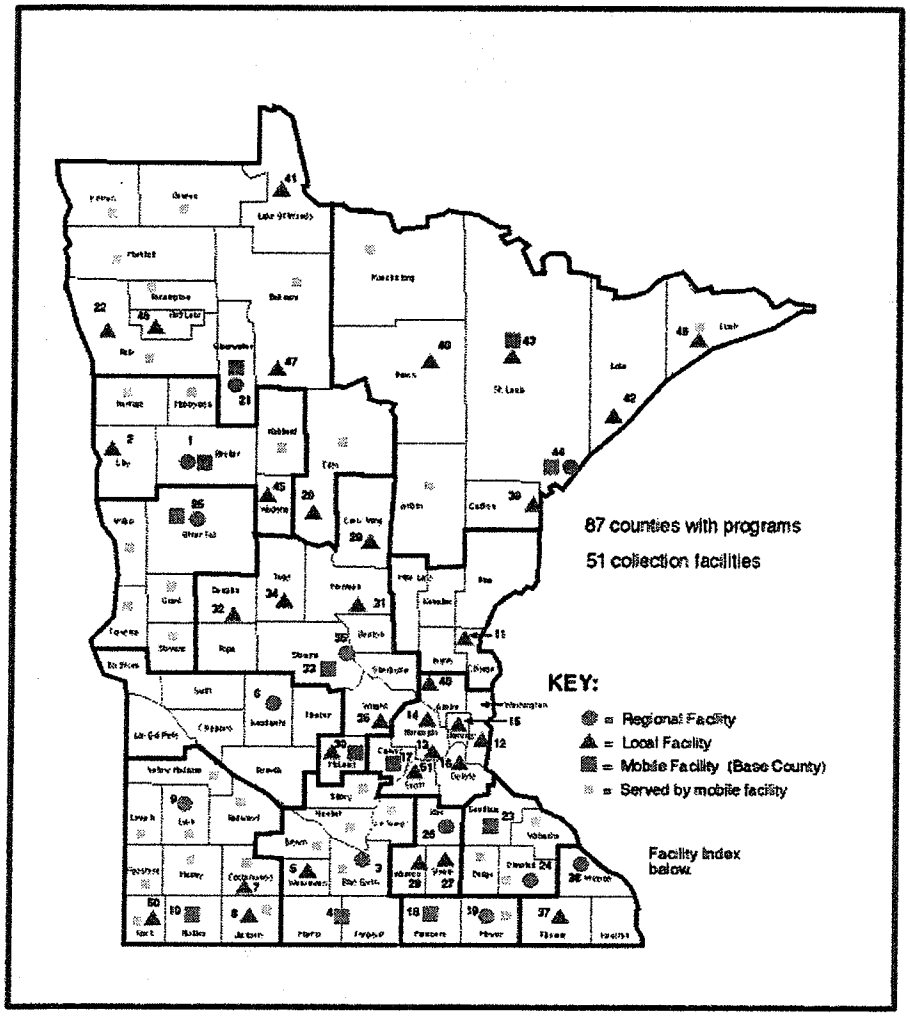


Figure 5: The Minnesota HHW Collection Network.

The statewide collection network includes 47 permanent or semi-permanent (i.e. seasonal) collection facilities and 11 mobile collection units. These units provided 1 785 one-day collection events throughout the state in 1999. Joint powers agreements (see above) are used throughout Minnesota to provide convenient collection services to

citizens. For example, the Solid Waste Management Coordinating Board (SWMCB), a joint powers board comprised of the counties of the Twin Cities, has established an HHW reciprocal agreement that allows metropolitan citizens to dispose of HHW, including household waste paint, at any metropolitan location regardless of the county in which that citizen resides.

In rural Minnesota, similar joint agreements are in place. A typical arrangement involves a number of counties sharing a central permanent collection site and a mobile collection unit that provides regional, remote HHW service throughout a region.

Table 4 depicts the volume of household waste paint collected by the various collection methods employed in the state. A slight increase in participation rate was evident between 1997 and 1999. An alternate data source, the Minnesota OEA, estimates that in 2001, Minnesota HHW collection facilities collected more than 800 000 ELC's (Equivalent Litre Containers) of latex paint and 600 000 ELC's of oil-based paint.

Table 4: Minnesota Household Waste Paint Collection Results.

	1997	**Total Paint Collected (ELC)**	**1999**	**Total Paint Collected (ELC)**
Households that delivered to permanent facilities:	**124 630**	**1 180 000**	**134 534**	**1 280 000**
Households that delivered to 1-day event:	**46 916**	**450 000**	**48 410**	**460 000**
Total households:	**171 546**	**1 630 000**	**182 944**	**1 760 000**
Total number of households in Minnesota:	**1 859 277**		**1 859 277**	
% participation rate:	**9.2**		**9.8**	

4.2.3 Cost

As above, SCORE program funding is a partnership between state and county levels of government in Minnesota. State SCORE funds flow to counties that meet certain requirements for recycling programs, including HHW collection. These funds are derived from the Minnesota Solid Waste Management Tax (SWMT) which is assessed on residential waste generators, commercial waste generators and construction waste generators. Upon receiving SCORE monies, counties are required to match 25 % of the total with local funds. Counties generally meet this commitment through various sources including landfill tipping fees, service fees (i.e. on utility or tax bills), county general funds and other miscellaneous sources.

The costs for HHW management in Minnesota were as follows (in U.S. $):

	1998	1999
Metro Area	4 799 277	5 488 524
Greater Minnesota	3 158 409	3 162 926
Total	7 957 687	8 651 450

Of these totals, the costs were allocated as follows:

HHW Direct Capital expenditures	16%
HHW Direct Operating Expenditures	31%
HHW Transport and Disposal	30%

The expenditures presented above include money that counties receive from the MPCA for HHW programs, but do not include money spent directly by the MPCA for administration and disposal. These direct MPCA expenditures, especially for

transportation and disposal of HHW, including household waste paint, collected at sites throughout Minnesota, are a significant financial contribution to local and regional HHW programs. Overall, the final expenditure for 1999 for HHW management was approximately $9.5 million dollars.

Of this total HHW cost, the determination of how much is expended on household waste paint management is difficult in view of the fact that expenditures are not separated based on the materials that are managed. However, statewide spending on paint recycling and fuel-blending in 2001 (i.e. transport and disposal) was $900 000. This does not include spending on collection, overhead, program administration and education directly attributably to household waste paint management. The addition of these cost components, estimated above at 70% of the total costs of a waste management program, brings the final tally for household waste paint management to an annual total of $3 000 000. (OEA, 2001).

Regardless, from 1994-1999, the overall cost of HHW management in Minnesota has increased by 45%. From 1997-1998, spending increased by over $1 million, and again from 1998 to 1999 by some $600 000. The Office of Environmental Assistance has attributed this increase to increased HHW educational and promotional efforts by counties. However, education expenses related to problem materials in 1998 were a relatively minor portion of overall expenditures, totaling just $294 199 and grants to cities and townships for HHW related projects totaled only $225 105. It would appear that a maturing program has seen increasing collection rates and an increase in the number of products collected with a subsequent escalation in cost. Indeed, over the 10

years that Minnesota has operated HHW collection infrastructure, collection rates have increased every year.

4.2.4 Use of Collected Material

Re-Use

In 1999, 78 of 87 local governments conducted household waste paint exchanges in conjunction with permanent or mobile HHW collection events. The OEA estimates that approximately 6% of all paints brought into collection facilities are re-used. Persons participating in these exchanges are required to sign a waiver acknowledging the risk involved in re-using paint. Paint that is made available on the exchange is re-labeled to indicate possible hazards and to indicate safe conditions for re-use.

Recycling

In an effort to boost sustainable practices with regard to household waste paint, state agencies have taken on a leadership role in Minnesota, especially in the area of recycling. During the spring of 1999, the OEA coordinated three demonstration projects which used 10 320 litres of recycled paint in new public building construction projects. In addition, the OEA has developed recycled paint construction specifications for architects, drafted paint feedstock specifications and recommended solutions to address recycled paint product quality, liability and warranty issues.

In October 1999, Amazon Environmental opened a latex paint recycling facility in Roseville Minnesota, thus providing a local option for counties to recycle latex paints. The company uses 100% of the received latex paints to produce a recycled product at a cost of $125/45 gallon drum (OEA, 2001). Local facilities represents a saving of 6-25% compared with if paint recycling was located out-of-state.

Approximately 20-25% of the paint that Amazon accepts are used to produce a limited color range, reduced price, recycled paint. Other latex paints are either given away to Amazon clients (i.e. suppliers of latex paint) or recycled to produce processed latex pigment (PLP) for use as filler in cement. In 1999, counties reported recycling 5 042 tons of HHW (Score Report, 2000), much of which was household waste paint. Amazon cites proprietary rights and does not disclose the amount of paint recycled in a given time period (Personal Communication-Seagala, 2001).

In July 2000, two recycled paints were added to the Minnesota Cooperative Purchasing Venture (CPV). The CPV is an organization that enables participants to purchase goods and services at low prices under contract terms established by the State of Minnesota. All governmental units are eligible for CPV membership. A governmental unit is defined as any city, county, town, school district, other political subdivision of this or any state, and any agency of the state of Minnesota or the United States, and includes any instrument of a governmental unit (MPCA, 2001).

Further local government policy developments are also aimed at improving the market for recycled paint. For example, in 2001, Metropolitan Area counties passed a resolution encouraging Minnesota counties, cities, state and other jurisdictions to begin using or to increase the use of recycled content paint for government projects (see Appendix C). The resolution asks each participating SWMCB county to incorporate into their contract specifications a requirement and waiver provision that recycled paint be used rather than virgin paint on county construction and renovation projects.

While progress toward sustainable practice has been made for waste latex products, in Minnesota, collected oil-based paints continue to be re-blended and sold to

cement kilns for use as an alternative fuel. Those paints that are considered hazardous are treated as hazardous waste and incinerated within the state or at various out-of-state facilities at an average cost of $110 U.S/45 gallon drum (OEA, 2001).

4.2.5 Education

Minnesota has approached HHW education as a mandatory component of HHW management. Counties must comply with the following in order to secure SCORE funding for HHW management.

> *The solid waste master plan must include a household hazardous waste management plan that must include a broad-based education component, including HHW reduction. Minn stat. 115A.96, subd. 6 (a).*

In addition, the MPCA has outlined clear education policies that counties are encouraged to follow with reference to the above requirement:

- HHW education programs shall assist the general public in the entire area served and attempt to serve all demographic audiences.
- HHW education programs shall offer education for the following components: identification of HHW, reduction of HHW, and proper handling of HHW.
- Each region needs to have and update an annual education plan that describes goals and methods to achieve goals. This plan should be submitted along with the annual reporting forms.
- The plan should include a summary of the HHW education goals for the upcoming year.
- Each county needs a system to handle inquires on HHW disposal.
- HHW education programs shall include a telephone advice system with trained staff to answer calls, and a method to publicize the number.
- HHW education programs shall be ongoing.

Typical education programs include newsletters, radio and newspaper advertisements and county websites that provide citizens with information on HHW including as a large component, household waste paint reduction and disposal. The use of telephone advice systems at the county level also provides a well-utilized education service to citizens.

In 1999 every local government in Minnesota provided its citizens with educational materials on the reduction, identification and proper management of HHW including household waste paint.

4.3 British Columbia

4.3.1 Introduction

In British Columbia, household waste paint management is undertaken by a non-profit association called the Paint and Product Care Association (PPC). The PPC consists of over 90 paint and solvent/flammable liquid manufacturers and more than 4 000 retailers from across the province. A board of directors of seven local brand owners governs the association. The PPC is required by law, to submit an annual report of activities and quarterly financial statements to the B.C. Department of Environment, Lands and Parks.

The objectives of the PPC's waste management program are:

1. Environmental Protection: The PPC seeks to protect the environment by developing and maintaining a collection and management system, which diverts leftover paints and solvents from local landfills, waterways and sewers. The PPC is committed to moving up the pollution prevention

hierarchy by developing new and innovative ways of recycling leftover consumer products.

2. Consumer Convenience: Recognizing that consumer participation is key to the success of its program, the PPC is committed to providing convenient, one-stop-drop facilities for the collection of regulated consumer products. There is no cost to consumers when dropping off products at these facilities.

3. Cost efficiency: Since consumers pay the cost of goods and services in the marketplace, the PPC recognizes the importance of keeping the program costs reasonable. The PPC seeks the most cost-effective ways to meet its objectives and responsibilities.

The PPC was formed by the amalgamation of two formerly separate non-profit-industry associations- (The Paint Care Association (PCA) and the Solvent Care Association (SCA) in an effort to reduce program overlap and minimize costs. Both of these bodies were formed in response to legislation enacted by the provincial government that transferred the responsibility for the management of these respective waste streams away from government to producers and consumers (PPC-waste paint and SCA- waste solvents, gasoline and pesticides). See Appendix B.

4.3.2 History of the Program

The following timeline outlines the roots and implementation of the management program in British Columbia:

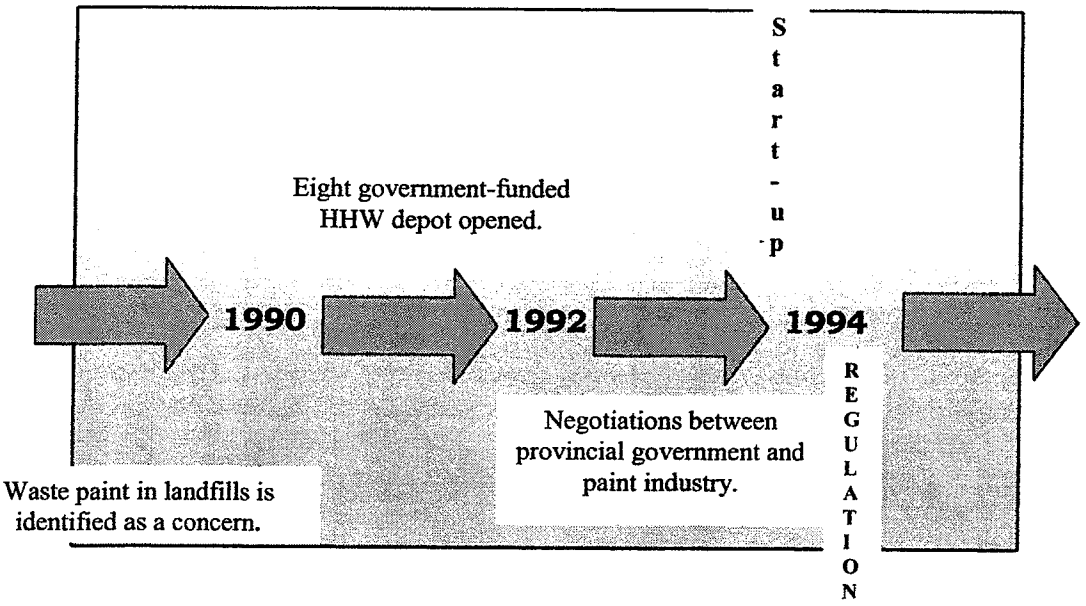


Figure 6: Timeline of Development of the B.C. Waste Paint Stewardship Program.

In the late 1980's and early 1990's concern regarding household products such as paint, oil and pesticides entering landfills and sewers coupled with B.C.'s diminishing landfill capacity had grown to the point where consumers and government were looking for alternative disposal options.

In 1990, the Department of Environment, Lands and Parks opened a network of eight government funded HHW collection depots. This network was unsuccessful in alleviating concerns about HHW disposal for a number of reasons:

1. Depots were only funded to be open 4 days/month.

2. Eight depots offered insufficient geographic coverage of the province while funding was paid for by taxpayers province-wide.

3. Material that was collected was not recycled and little reuse occurred.

(Personal Communication-Uyeyama, 2000)

The failure of the government run depot system and changing concepts of who should be responsible for managing waste products led to the opening of negotiations between the B.C. paint industry and the Department of Environment, Lands and Parks, in 1992. Initially, the paint industry believed that the process being undertaken were voluntary discussions regarding household waste paint management. As it became clear that this was not the case, the paint industry hired a highly placed ex-B.C. government official to work on its behalf, thus raising the stakes and increasing the political nature of the discussion.

As the negotiations entered their second year with little progress, the province decided to take action. The result was the enactment of the B.C. Post Consumer Paint Stewardship Program Regulation (See Appendix B) in 1994 and eventual formation of the PPC.

Throughout the negotiation process, if in the case of a change in program, the paint industry was to have one year to bring forth and implement a stewardship program. As the process neared completion, the implementation time-frame was shortened to six months and finally when the regulation became law, industry had 43 days to have a program in place. Negotiators for the paint industry were not aware of the draft regulation being brought into law until after it was made public.

4.3.3 Program Implementation

The initial regulation called for retailers to accept waste paint unless a stewardship plan was submitted and approved by the Province. In response, some members of the paint industry formed the PPC and submitted a stewardship plan that introduced an eco-fee to be levied on consumer paint purchases. This plan was deemed acceptable by the provincial government and forms the basis of the current program. Other retailers initially chose not to join the association and attempted a return-to-retailer type of collection program. This proved to be economically infeasible and these establishments joined the association in short order.

In 1994, the PPC operated a series of one-day collection events until a permanent network of depots could be developed. This initial year saw a number of problems. First, the association was unable to meet the initial environmental targets set by the province. The association was cited by the province in a number of instances for insufficient collection results and poor environmental performance (Personal Communication-Douglas, 2000). Second, consumers throughout the province were paying an eco-fee but adequate collection services were not in place. Both of these concerns were alleviated as permanent depots were opened in subsequent years of the program (Personal Communication-Crandell, 2000).

4.3.4 Current Program

Currently, the PPC operates over 100 permanent paint collection depots throughout the entire province of British Columbia. Collection depots are mainly private enterprises that are capable of accommodating waste paint collection in addition to their current business. These include bottle depots, motorworks, recycling centres and fire halls. Of

these depots, as of 2001, only one is operated at a municipal waste collection facility by a local government.

This permanent depot network is supplemented by a series of one-day collection events. Since the program's inception, the PPC has offered 210 one-day collection events in remote or smaller markets.

Collection depots are screened by the PPC and inspected to ensure that they meet relevant health and safety regulations. While the PPC has had no reportable spill or environmental incidents, these self-inspections have led to the closure of 2 depots because of environmental health and safety concerns. Depots are not inspected by the provincial government's Department of Environment, Lands and Parks but are subject to inspection from the B.C. Workers Compensation Board.

The PPC provides depot operators with tub skids (See Photo 4) in which closed cans with lids are placed for transport. Full tub-skids are transported to the PPC's central bulking facility in Vancouver where they are sorted and bulked accordingly for appropriate end-use. Latex paint recycling occurs at this location; all other processing occurs off-site. Depot operators are paid based on the number of tub skids that are collected.

Photo 4: Tub Skids used for Transporting Household Waste Paint in British Columbia.

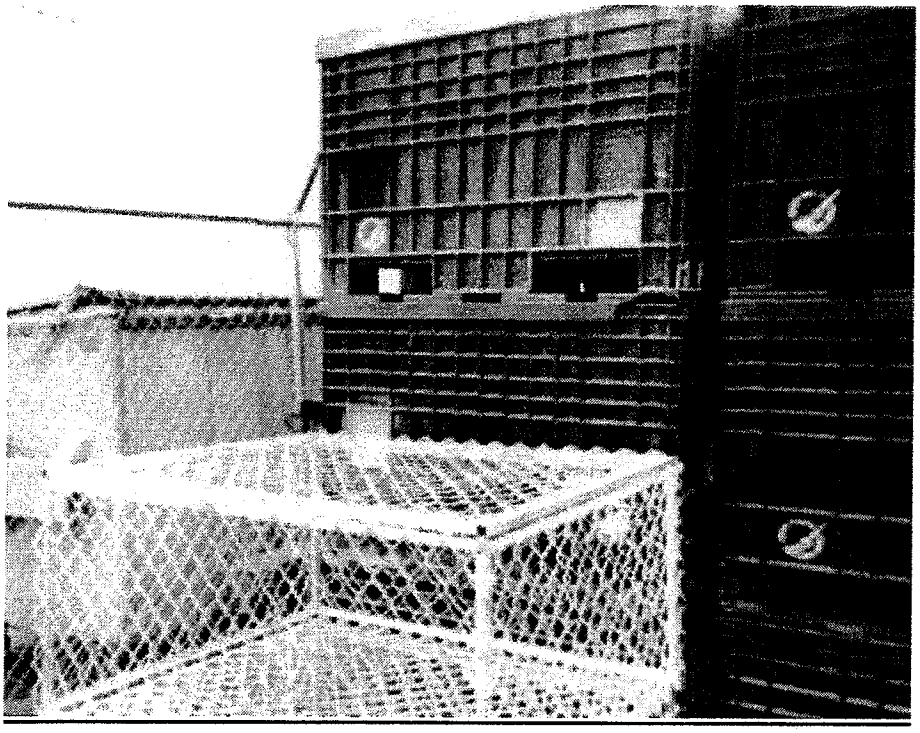


Photo 5: Waste Paint Collected at the B.C. Paint Bulking Facility.

Photo 6: Sorting at the B.C. Waste Paint Bulking Facility.

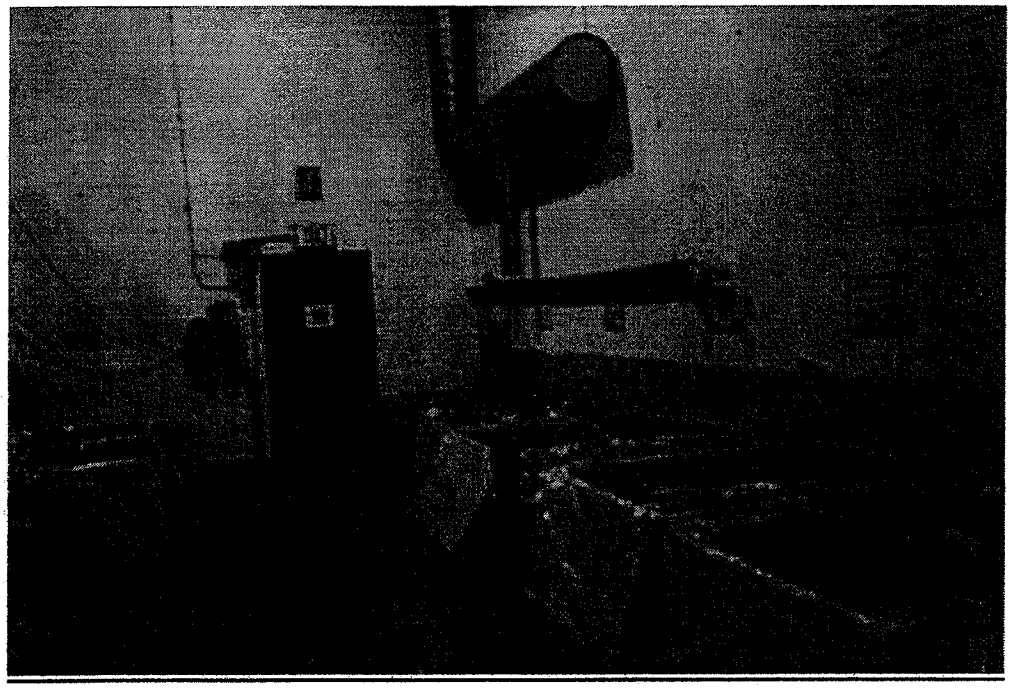
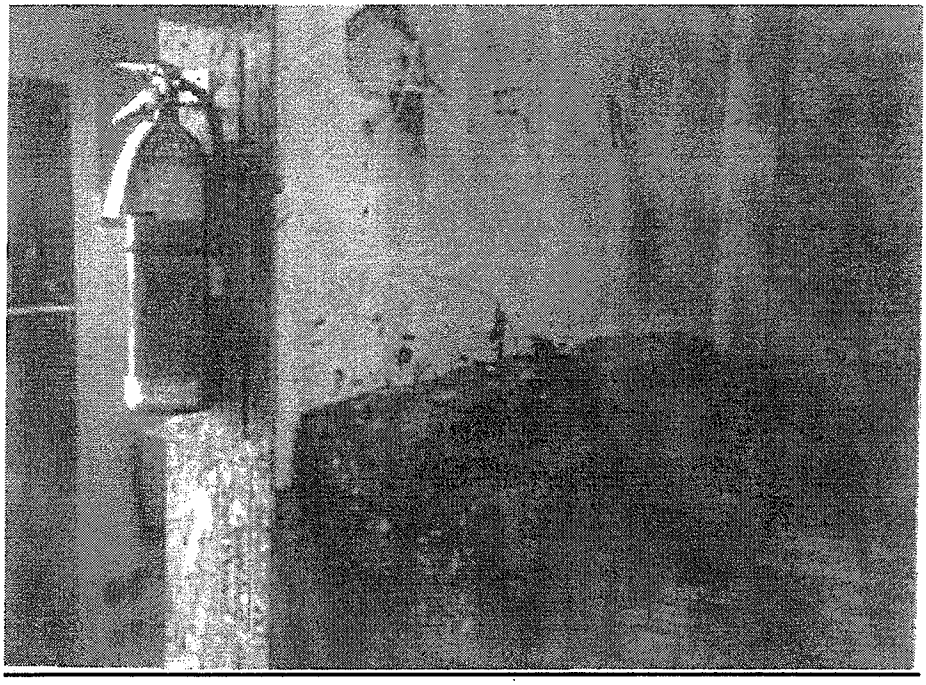


Photo 7: Processed Latex Pigment at the B.C. Waste Paint Bulking Facility.



4.3.5 Collection Results

Of the material collected by the PPC program, nearly 90% is paint. The remainder consists of solvents, gasoline, pesticides and non-program materials including unknowns. Figure 7 depicts the collection results over the life-span of the program.

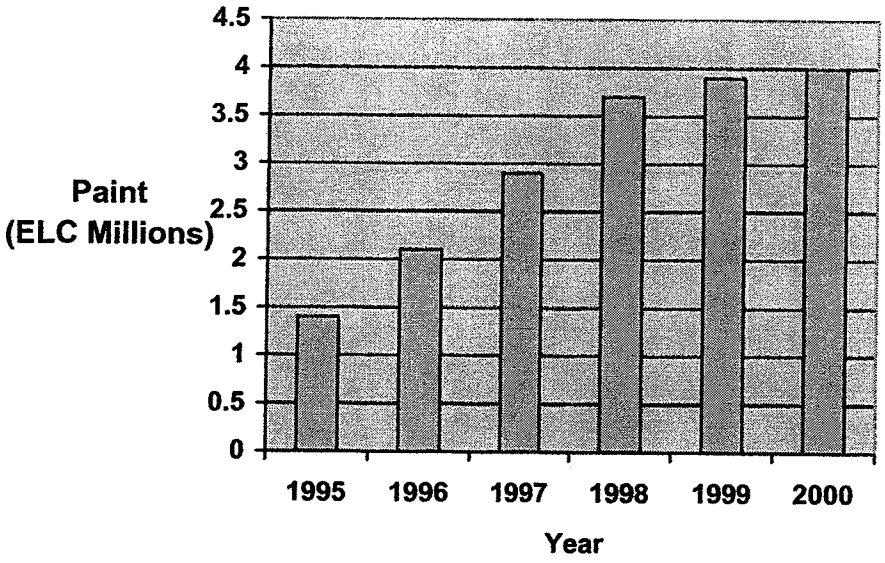


Figure 7: Waste Paint Collection Results in B.C. in Equivalent Litre Containers (ELC's).

* Total paint collected to 2000: 18.0 Million ELC's.

4.3.6 Eco-Fee

The entire program is funded through a surcharge to paint purchases termed an "eco-fee". This fee is collected by PPC members at the point of purchase and is a separate line item from the total for the paint purchase on the receipt. Eco-fee are submitted by members to the PPC for use in collecting and managing household waste paint in the province. Audited financial statements must be submitted to the provincial department of Environment, Lands and Parks and are available to the public.

The value of the eco-fee has been set by the PPC to reflect the management costs of products and not the associated environmental costs. Because the management costs of latex and oil-based paints are similar, the levy on equal volumes of these products is the same.

For paint, the following eco-fee schedule is in effect:

Volume	Eco-fee
250 ml or less	$.10
251 ml-1 L	$.25
1.01-5 L	$.50
5.01-23 L	$1.00
Aerosols	$.10/can

In 1999, in British Columbia, revenue generated from the eco-fee was 3.3 million dollars and expenses were 3 million dollars. The PPC unit cost for managing leftover paint has decreased from $1.61/elc in 1994 to 0.64/elc in 1998 (Personal Communication-Iverson, 1999). This eco-fee through the PPC funds the following activities:

Collection of funds.
Administration of program (operation, training etc.).
Collection operation. All depots except 1
Post-collection-transport, processing, disposal.
Processing- including bulking and warehousing.
Treatment and disposal.
Consumer education-user and retail.

(Personal Communication-Iverson, 2000)

Of these operations, approximately 15% of funds are allocated towards collection infrastructure, training, and operation and 50-60% of funds are used for post collection transport and disposal. This total includes the cost of managing non-program materials that are collected at depots.

In 1999, the PPC paid nearly $200 000 to manage non-program materials. In 2000, the PPC lowered this cost by between 1/2 and 2/3 by implementing a disincentive for depot operators to accept non-program materials. The PPC has initiated a charge to

depot operators to transport non-program materials from depots. The result is that depot operators are beginning to turn away non-program materials.

This attempt at cost saving is compatible with the PPC objective to lower the overall cost of the program and hence the value of the eco-fee. In B.C., a lower eco-fee may soon be in place for two reasons. First, overall program efficiency has improved since the beginning of the program. Second, the PPC has begun accessing more lucrative end-markets for products derived from the paint that it collects compared with initial activities.

4.3.7 Use of Collected Material

Since the inception of the household waste paint program, the PPC has successfully moved up the pollution prevention hierarchy to the point that in 1998, no leftover paint was sent to landfill.

Paint collected through PPC's program during 1999 was managed as follows:

Treated/contained/landfilled .	0%
Utilized for recovery of energy.	16%
Reused for intended purpose.	8%
Recycled.	76%

The following is a discussion of end-uses in British Columbia.

Reduction

There has been no noticeable change in consumer purchases attributed to the placement of the eco-fee. In B.C., the eco-fee is not designed to be a preventative cost measure but rather to offset the cost of collection and management of household waste paint.

Reuse

Reuse has been limited by the number of available pails for repackaging collected household waste paint. In addition, the B.C. government's policy of using collected paints for public works projects ended in 1998. The provincial government deemed that the supply was too erratic to continue a policy of re-using collected paints.

Recycling

The PPC uses all collected latex paint (except those containing hazardous chemicals such as PCB's, pesticides and others) to produce latex bricks that are used as filler in construction projects. No paint is recycled to produce a paint product. The PPC's policy is to not pursue the recycled paint market because this would result in a situation where the association competed with its own members for paint market share.

Oil based paints are bulked and shipped for incineration to locations both in and out of the province depending on current market conditions.

4.3.8 Education

According to the PPC, public awareness of the paint management program is high. The provincial government is also satisfied with the public's awareness of the program but contend that improvement is possible. The provincial regulation that guides the program mandated an initial education program to alert local residents of the availability of new collection facilities (See Appendix B) but does not require ongoing education programs .

However, other education initiatives are:

Eco-fee

While the eco-fee may not deter purchases, because it is a visible levy, it

notifies people as to an available service.

RCBC Consumer Hotline

The PPC provides funding to the RCBC (Recycling Council of British Columbia) consumer hot-line. This service provides consumers with information regarding the proper disposal of products from pharmaceuticals to refrigerators, including paint.

Brochures and Publications

The education program has focussed on the B.U.D. (Buy, Use, Dispose) model. However, new brochures have not been published in a number of years.

Website

The PPC has developed a web-site that disseminates collection information, B.U.D information and other relevant details of the household waste paint management program in the province.

Depot employee training

The PPC provides a training manual of approximately 30 pages in length with pictures, written at a Grade 10 level, to all depots. This has been found to be more successful than initial manuals which were much more complicated and included decision trees for the determination of what is acceptable at collection depots. In addition, depot reviews and operational audits, conducted by PPC staff, provide education to depot operators and workers.

Chapter 5: Comparison and Analysis

5.1 Process to Date in Manitoba

In 1998, the Manitoba Department of Conservation formed a Household Hazardous Waste Management Committee to discuss and aid in the implementation of a HHW management program that would include household waste paint. After the finish of committee consultations, the Manitoba Department of Conservation developed a proposed household hazardous waste stewardship regulation in 2002 for public comment.

The overall challenge to change household waste paint management in Manitoba stems largely from moving past discussions that have occurred to concrete action. The HHW committee has endorsed the concept of "shared responsibility" but has failed to define how it applies to HHW or household waste paint management. The relative failure of the Manitoba HHW committee meetings to achieve meaningful consensus on this important, guiding definition of a future program impacts funding responsibilities for various players in a future program. The source of funding for a future program is a critical issue that, if not resolved satisfactorily, may prevent changes from the status quo in Manitoba. As in B.C., leaving the paint industry and municipalities to sort out their respective roles and responsibilities, including respective financial commitments after a provincial program regulation, is not only a difficult task but also impacts the overall performance of the program. In B.C., during program planning and consultations, interested parties agreed that municipal collection sites were the most efficient area for household waste paint collection. However, because the paint industry and municipalities could not agree upon who should pay for these sites, currently there is only one municipal collection site in the province. Collection rates in British Columbia likely

suffer because many collection locations are not at ideal sites that offer "one-stop" disposal for all waste streams.

Difficulty in reaching a clear definition of "shared responsibility" in Manitoba is hindered in part by the inability of the City of Winnipeg, at the time of this writing, to be involved in any form of financial responsibility for household waste paint management. While the City accepts the concept of shared responsibility and recognizes the importance of household waste paint management, budget limitations are cited as the reason for its inability to contribute to any proposed management program for this waste steam. With no provincial regulation currently in place and with nearly 70% of the provincial population residing in Winnipeg, this jurisdiction's participation may be necessary in one form or another to make the overall program environmentally significant and to provide leadership to other municipalities with regard to environmental issues and services. If the City of Winnipeg had been open to some form of negotiation, the Manitoba consultation process likely would have moved more quickly toward conclusion.

These types of issues have hampered the progress of the Manitoba HHW committee. Further, the committee involved a diverse and changing number and identity of participants. See appendix E. This open process has had both positive and negative aspects. The obvious positive benefit has been the opportunity for a diverse range of points of view regarding HHW to be brought forward. Conversely, this ever-changing cast of participants served to delay and hinder the progress of the process as new members joined the process. In addition, notably absent from early meetings was representation from the province's waste management industry. This absence is particularly crucial if waste managers are to play any role, for example, processing

collected paint, in a future household waste paint management system. Involvement from this sector would have allowed more cohesive/proactive planning and quicker implementation if changes had been decided upon especially considering the valuable role that local infrastructure for household waste paint collection and bulking plays in a sustainable household waste paint management system.

The following sections compare the current Manitoba system, British Columbia and Minnesota for consideration in light of proposed or pending changes in household waste paint management in Manitoba.

5.2 Comparison of Jurisdictions

Chapter 4 presented the details of how household waste paint is managed in the three jurisdictions under study, Manitoba, Minnesota and British Columbia. Chapter 5 is concerned with comparing this information with reference to the sustainable components of a household waste paint management system identified in Chapter 2.

Towards this, section 5.2.1 compares performance measures (education, collection, end-use) that indicate progress toward sustainable practice in household waste paint management. Section 5.2.2 deals with how the level of funding, source of funding and the method by which this funding is managed impacts these performance measures and hence overall program sustainability in the case studies.

Taken together- the comparison of performance measures and analysis of funding arrangements- the overall strengths and weaknesses of each program becomes evident. Based on this, section 5.3 of this Chapter is a discussion of issues unique to Manitoba that have a bearing on household waste paint management and especially in identifying how successful actions and programs in B.C and Minnesota may apply to Manitoba.

5.2.1 Performance Measures

Household Waste Paint Education

Table 5 is a comparison of various aspects of household waste paint education programs in Manitoba, Minnesota and British Columbia.

Table 5: Comparison of household waste paint education programs in Manitoba, Minnesota and British Columbia.

	Manitoba	Minnesota	British Columbia
Media	Internet/utility inserts	Internet/radio/newspaper/local phone advice	Internet/radio/newspaper/ provincial phone advice
Point of contact	Post-purchase	Pre/post purchase	Pre/Point/Post Purchase
Content	Collection logistics	B.U. D./ Collection/ Recycling/Re-use	B.U.D./Collection
Target	Public	Public/government/ paint industry	Public/depot operators
Accountability	Limited	Partial program funding depends on annual programs. Legislated ongoing requirement.	Legislated initial education programs.

Minnesota has taken a comprehensive approach to waste management education , including household waste paint within overall HHW education. This approach includes legislated, on-going education planning and publications and includes pre-purchase and post-purchase materials. Various media types have been used and a county telephone

advice system for waste disposers is a mandatory part of education programs in the state. That these components are pre-requisites in Minnesota for a county to receive SCORE funding for waste management activities motivates local government to maintain current household waste paint education programs and is a significant reason why every local government in Minnesota was involved in some form of HHW education in 2001.

The strength of the B.C. education program is that it included, initially, mandatory point-of-purchase education materials and new depot notification in accordance with the B.C. Post-Consumer Paint Stewardship Program Regulation. This is the only case study that includes a point-of-purchase component of household waste paint education. However, education materials have not remained current in B.C. for three reasons. First, annual education programs are not a legislated requirement of the management program. The PPC is not required, by law, to undertake specific, annual education programs. Second with the PPC achieving positive collection rates and meeting collection targets, there is no motivation for the PPC to develop and run education programs to increase collection rates. Such actions would only serve to increase the cost for the organization with little perceived benefit especially when collection rates are deemed to be acceptable by the province. Third, education materials that encourage reduced paint purchases as a means to reduce the generation of waste paint is antagonistic to the profit-driven paint industry and hence, the PPC, being an industry association is unlikely to promote this form of sustainable management for household waste paint beyond minimum requirements.

The Manitoba education program is the least significant of the three cases. There is no current program specific to sustainable household waste paint management or even

HHW management in the province. The Miller HHW collection events are only advertised as to time and location details-a post-purchase education component.

Collection

All three jurisdictions combine permanent collection infrastructure with mobile, short-term events. However, significant differences occur in the number of such permanent depots and collection events. In British Columbia, the PPC operates approximately 100 permanent depots for household waste paint collection that, by law, must be open five days per week, one day of which must be Saturday. In addition, the PPC operates one mobile collection unit that has provided 210 one-day collection events in smaller or remote markets since 1994. Minnesota has 47 permanent or semi-permanent HHW collection facilities and 11 mobile collection units that, combined, accounted for 1 785 one day collection events throughout the state in 1999. Manitoba has one permanent facility that is open two days per month for HHW collection and held 13 rural one-day collection events in 2000.

The collection rates achieved by this varying infrastructure is summarized in Table 6. Clearly, British Columbia has enjoyed the highest absolute collection rate for household waste paint and the highest collection rate/person-both positive performance measures.

Table 6: Comparison of Household Waste Paint Collection.

	Paint Collected (ELC)	Population	Collection/person (L)
Manitoba (2000)	280 000	1 146 000	.24
Minnesota (1999)	1 760 000	4 919 479	.36
British Columbia (2000)	4 000 000	4 058 800	.99

As a further measure of collection success, Table 7 presents the capture rates of available household waste paint for the three jurisdictions.

Table 7: Comparison of Capture Rates of Household Waste Paint in Manitoba, Minnesota and British Columbia.

	# of households	Est. Generation rate/household/yr	Total Waste Paint (L)/yr
Manitoba	419 385 (1996)	12 Litres	5 320 000
Minnesota	1 859 277 (1999)	12 Litres	22 310 000
British Columbia	1 424 635 (1996)	12 Litres	17 090 000

	% Household Waste Paint Collected
Manitoba	5.2%
Minnesota	7.9%
British Columbia	23.4%

The figure used in Table 7 for the estimated generation rate/household/year (12 L) is constant value obtained from the literature review, Chapter 2- Sustainable Management of Household Waste Paint. As noted, this figure varies depending on the source and

method of measurement and therefore, the capture rate calculated may differ based on the figure used in the calculation. Regardless of the absolute figure, however, a clear hierarchy in capture rate of British Columbia, Minnesota and Manitoba is evident.

The difference between capture rate and collection rate is a significant one that none of the jurisdictions under study have made. In Minnesota and B.C., the tendency has been for the collection organizations to report increasing collection volumes without any measure of capture rate. This is particularly unsustainable if waste paint generation rates are actually increasing faster than collection rates. Both jurisdictions would be better served if collection targets were in place and some mechanism or formula for determining capture rate was included as a part of these targets. For example, a standardized method for determining waste paint generation rates for comparison with collection rates would provide a more realistic measure of success in not only collection but in reducing household waste paint generation. The link to waste paint reduction and household waste paint education that capture rate makes is missing in all of the cases under study and gives the reported collection figures less context and relevance than may otherwise be possible. In essence, a cycle of increased paint sales, increased waste paint generation and increased collection may be occurring without a consideration of capture rate.

Regardless, B.C. has achieved a significant collection rate while Manitoba and Minnesota clearly have not, however, room for improvement remains in all cases. Clearly, the degree to which collection infrastructure is developed impacts the overall collection rates enjoyed by the three jurisdictions. However, notably, Manitoba and Minnesota have experienced similar capture rates with large differences in collection

events/infrastructure, thereby emphasizing the importance of designing collection infrastructure while considering demand and education programs. For B.C., further improvement may be difficult with no evidence of an agreed upon formula for determining capture rate, no legislated capture rate targets, stagnant education programs and collection totals which appear to have reached a plateau. In B.C. , then, despite encouraging results, a significant volume of household waste paint remains to be captured. However, continued improvement in future years is a seemingly difficult proposition unless driven by changed targets, back-drop legislation or demand for products made from collected waste paint.

End-Use of Collected Paint

Table 8 is a summary of the end-use of collected household waste paint in Manitoba, Minnesota and B.C.

Table 8: Comparison of Uses of Collected Household Waste Paint in 1999.

	Manitoba	**Minnesota**	**British Columbia**
Reduction	No evidence	No evidence	No evidence
Re-use	Limited	6%	8%
Landfill	60%	Not available	0%
Incineration	40%	42%	16%
Recycling	0%	Not available	76%

In Manitoba, collected household waste paint is either landfilled for the case of latex paint or incinerated for alkyd based paints. This type of disposal is one step more environmentally beneficial than if this waste stream were not part of the Miller collection program and were simply included with regular municipal waste collection. Higher order disposal processes such as recycling waste paint into PLP do not occur in Manitoba.

In B.C., sustainable end-uses for collected household waste paint is one of the success of the program. The PPC has achieved a re-use/recycling rate of 84%, thereby surpassing the legislated target of 70%. This type of target is not used in Manitoba or Minnesota and is a significant reason why B.C. has made significant gains in this area. No collected paints in B.C. are landfilled and only 16% incinerated. In contrast to Manitoba, the involvement of the paint industry in collection in B.C. has allowed for technical expertise to be applied in finding sustainable end-uses for collected waste paint.

Of note, all three jurisdictions have shown no evidence of waste paint reduction. This is an important component of a sustainable program that none of the programs under study have progressed toward assessing, measuring or accomplishing.

Cost Effectiveness

In summary, the fundamental, financial arrangements in place in the case studies are: In B.C., an eco-fee funds an industry-association management program that works within a legislated framework provided by provincial legislation. In Minnesota, local governments partner with state government to collect household waste paint as a part of a broad HHW and problem materials management program. These programs are funded by various taxes collected by each level of government. Portions of this overall funding is

dependent on the environmental performance of the local collection/management programs. In Manitoba, the provincial government uses tax revenue to contract household waste paint collection services. There are no specific legislated goals or targets for this collection program.

Given these arrangements, taken singularly, cost effectiveness is not an optimal means of measuring the sustainability of a household waste paint management program. For example, a program could collect a small volume of waste paint at a low cost and the result would be a cost-effective program that allows a high level of pollution. This is evident in Manitoba where a modest amount of money is spent to collect a modest amount of household waste paint (i.e. capture rate of 5.2%) . Table 9 describes the cost effectiveness of each jurisdiction.

Table 9: Comparison of Cost Effectiveness of Household Waste Paint Management Programs in Manitoba, Minnesota and British Columbia.

	Paint Collected (ELC)	Cost ($)	Cost Effectiveness ($/ELC)
Manitoba (2000)	280 000	420 000	1.50
Minnesota (1999)	1 760 000	3 000 000	1.70
British Columbia (1999)	3 800 000	3 000 000	.79

A cost-effective program, see B.C. above- .79$/ELC and falling (Personal Communication, Iverson-2000), combined with positive performance measures such as overall collection rate and recycling rate indicates successful management practices that serve to lower costs, the goal of any organization responsible for household waste paint management. In short, if household waste paint management costs too much, it is highly

unlikely to be undertaken and sustained by any organization, be it private company, stewardship organization or government department. As such, efficient programs and hence cost-effective programs have a better chance of achieving sustainability.

Of the three cases under consideration, the industry model, B.C., is the most cost effective. See below for further discussion. Manitoba is relatively cost effective for a publicly funded program but as above, collects only small amounts of household waste paint. This is also a reflection of the efficiency of Miller Environmental, and the overall mature, long-term nature of the current level of service in the province. Of particular note, Minnesota spends a large amount of money on HHW management including household waste paint. This is somewhat inflated given the scope of the program undertaken, however, the overall cost of the program with only a slightly higher collection rate/person than Manitoba is a weakness of the program and is a strong reason why the current arrangement cannot be supported indefinitely. In short, with over $6 million spent on HHW management in Minnesota, in 1999, one would suspect that more household waste paint, the most prevalent portion of HHW, would have been collected

5.2.2 Further Discussion: Stewardship and Sustainability

Manitoba

If the current arrangement for household waste paint management in Manitoba were to persist, the amount of household waste paint in the environment would remain a concern. With the current public funding arrangement, a large amount of money would be required to achieve meaningful collection rates, even to B.C. levels. The immediate reasons for the programs lack of sustainable practice are two-fold. First, Miller

Environmental has been provided with no targets for re-use or recycling rates as part of the tender process by Manitoba Conservation. Miller is in the business of hazardous waste disposal, therefore, the decision of how to treat paint that is collected is based solely on immediate economic factors. Because re-use and recycling waste paint is a money losing proposition for a hazardous waste disposal company in Manitoba, and no targets are in place, Miller has no incentive to pursue these environmentally desirable options through creativity and/or market development. Second, overall lower collection rates when compared to other programs, as the current arrangement exists are largely a reflection of the amount of money committed to the program by the province. Current Miller infrastructure is operating at or near capacity. This implies that without an infusion of money to provide more depots and more education programs, collection rates will remain at or near current rates.

Minnesota

Similar to Manitoba, in Minnesota, the cost of waste paint management is the burden of taxpayers. However, in contrast to Manitoba, Minnesota has dedicated a more significant level of funding to HHW and other problem material management including household waste paint.

Beyond this difference in level of financial commitment, another difference is apparent. In Manitoba, the general attitude is that current public spending on household waste paint is not worth the environmental benefit. However, in Minnesota, with much higher spending on household waste paint management, many waste managers contend that the financial costs associated with the program are worth the long-term

environmental benefits (Personal Communication-Altman, Boe, Lawerence, Weaver, 2001). Regardless, however, the sharply rising costs of the program without any evidence of reduced generation rates suggest that a finite point exists whereby the cost will not be worth the environmental benefit. At this point, some alternative funding arrangement will become necessary for the state.

In light of this pending limit, the alternatives that are being pursued through state funding and leadership are aimed at developing the recycled paint industry to the point where household waste paint management can become a for-profit environmental industry. See Appendix D. For example, state demonstration projects of the efficacy of recycled paint and the attraction of a paint recycling company to Roseville, Minnesota are positive steps aimed at increasing the demand and lowering the cost of recycled paint. If the demand for recycled paint is high enough, a paint recycler may become willing to pay for the raw material- household waste paint- to the extent where the cost of collection is shifted away from the taxpayer to the recycler. With a local paint recycler in Minnesota, transportation costs are lower than if a recycling facility is located a further distance from the supply of household waste paint. Hence the cost of the recycled paint can be lowered and the product becomes more competitive with virgin products. Local spin-off benefits such as job creation, economic growth and overall environmental awareness are also fostered by the Roseville project.

Similarly, on-going, legislated education programs geared toward HHW in Minnesota are aimed partially at reducing generation rates and promoting recycled alternatives. To date, it is too early to assess the effectiveness of these demand side actions in "closing the loop" for household waste paint in Minnesota. However, a local paint recycler and a

strong education program are two prerequisites in place for developing household waste paint management over the long term.

A further long-term benefit of the current Minnesota program is the focus on all problem wastes rather than simply household waste paint or even HHW. This comprehensive system provides convenient, one-stop waste collection for citizens with resultant environmental benefits. Because non-paint HHW products are among the most expensive to properly dispose of and manage, the cost involved in such an operation is significant and is a contributing factor to the overall cost of the Minnesota management program. However, when regarding the entire problem materials waste steam, costs associated with infrastructure, staffing and bureaucratic overlap are eliminated with this more comprehensive approach. The benefits of this type of arrangement are further evidenced in B.C., where over the life span of the household waste paint management program, there has been an amalgamation of other HHW waste streams with waste paint collection in an effort to eliminate overlapping program costs. Similarity in product composition suggests that this may be a natural progression for waste management for these types of waste. Minnesota has used the entire HHW waste stream as a starting point for a program rather than breaking HHW into smaller product streams to be managed separately.

Further, even though some waste stream amalgamation has occurred, British Columbia's household waste paint program still encounters non-program materials that the PPC is reluctant to deal with because of the costs associated with proper management. These materials represent an un-managed, potentially dangerous component of the overall B.C. municipal waste stream. A lack of clear responsibility for these materials has

resulted in a situation where consumers have no viable alternatives for disposal of many hazardous products. In B.C., this may result in improper disposal or storage, until such time as responsibility is defined. In the broad approach used by Minnesota, this type of situation does not occur.

Minnesota has realized the following benefits of involving government or related public agency in the management of non-paint/non-program materials:

- The paint industry cannot be fairly expected to manage expensive, inevitable, non-program materials that it has no responsibility for producing.
- Government involvement in managing non-program materials limits expensive liability and remediation costs associated with these products if and when they may end-up in landfills.
- Initial government involvement motivates the pursuit of sustainable management programs for these non-program materials, including a potential expansion of a jurisdiction's stewardship framework. Minnesota works toward methods of transferring waste management responsibilities to generators.

The final positive aspects of the Minnesota HHW management system are the regional approaches and agreements that are in place. For example, many counties have agreements in place to share collection infrastructure. These are examples of how flexible, local arrangements have best served to enhance collection while working within local parameters. In addition, this type of local government involvement has allowed for better integration of the waste paint management system within other waste management

activities. Again, it is early to assess how this type of integration will impact collection rates in Minnesota however, waste disposal is a "one stop shop" for waste disposers in the state, a convenience that bodes well for increasing collection rates.

In contrast, B.C. has unsuccessfully pursued a collection network based on municipal locations. The vision of "one-stop shopping" for waste management, one of the stated objectives of the PPC (see above), is desirable because it provides convenience for disposers thereby improving collection rates. As the number of waste streams eligible for special collection expands, British Columbia is challenged by the increasing complexity in management programs and must be wary of waste generator frustration and confusion regarding overly complex disposal options and requirements.

British Columbia

The B.C. household waste paint management system has grown significantly toward sustainability since the formation of the PPC and especially since initial government collection programs. British Columbia has achieved these encouraging results by shifting responsibility for the management program to those who are responsible for creating household waste paint.

By shifting the take-back obligation for household waste paint to the paint industry, and hence consumers, the sustainability of the program has improved for the following reasons:

1. When the paint industry is responsible for the cost associated with the collection and end-use of waste paint, a fund-raising tool such as the eco-fee, hidden levy or deposit refund must be employed. In order to minimize this increase in product cost and

maintain the competitiveness of its products, the paint industry is motivated toward sustainable practices. For example, a collection system that maintains options for re-cycling becomes desirable because re-cycled product markets are methods for recovering costs of collection, thereby limiting the amount of money that must be raised through levies and hence, a lower absolute cost is possible for paint products.

2. The knowledge and expertise of the paint industry combined with its control of collection of household waste paint also promotes sustainable end-use. Better sorting protocols and more innovative end-uses are pursued based on technical expertise thus preserving the value of the collected product. Creative market development for recycled products is encouraged to increase revenue thereby lowering the costs which need to be raised through the eco-fee.

3. Because latex paint has more valuable potential end-uses than oil-based paints and because oil-based paint are significantly more expensive to dispose of than latex paints, the paint industry is motivated to produce environmentally friendly latex paints rather than oil-based products. In the long-term this may contribute to a change in the composition of the waste stream in favour of latex products although currently consumer demand is also driving this positive change.

4. The transfer of the take-back obligation provides flexibility and freedom for industry when compared to a "command and control" system. This freedom provides motivation for industry to prove to government and citizens that it can be

environmentally friendly members of society. It should be noted that this change from traditional systems requires flexibility on the part of members of the paint industry and from government agencies and requires sufficient environmental awareness from the general public. In addition, government must be politically willing to accept public complaints regarding the imposition of a tax if a product levy is used. Regardless of the collector of these funds and how they are to be used, government will still be seen by some in the public to have imposed "another tax".

These points illustrate how industry responsibility motivates more sustainable practices in household waste paint management. However, for waste paint, when the take-back obligation rests with the paint industry, limits are encountered. For instance, reducing the amount of waste paint that is generated is difficult. Reduction would involve lowering the amount of paint sold, a goal directly antagonistic to the profit driven paint industry. Hence, because reduction targets are not in place and the focus in B.C. remains on increasing collection rates, reduction has not occurred in the province, to date.

Similarly, paint stewardship is somewhat unique when compared with familiar stewardship programs. For packaging stewardship, reduction does not involve the product of interest, only the package around that product. For oil and tires, the life span of these products is finite and once that life span has been reached, limited re-use value occurs. Replacing tires and oil involves purchasing a fixed amount of the product of interest (i.e. four tires/ 1 quart of oil). Paint is unique because much of the waste generated is simply oversold/underused product. The paint industry has a vested interest in the status quo of overselling product and having limited re-use. Therefore, within the

pollution prevention hierarchy in B.C., reduction would involve changing this practice and re-use programs would limit market for new paint products. These higher-order process require actions by the paint industry and the PPC that is antagonistic to industry profit goals at the cost of environmental practice.

Packaging paint into "measured volumes" rather than "what is needed" amounts is a hurdle for reduction efforts. Campaigns, such as B.U.D, which emphasize to consumers the necessity of buying only that volume of paint which is necessary work to promote reduction and are useful. However, what is the motivation of the paint industry to sell a consumer three quarts of paint rather than a gallon and lose profits in the name of better environmental practice? Further, if the paint industry can advertise an environmentally friendly collection network for waste paint such as in the case of British Columbia, some consumers may buy more rather than less paint with the knowledge that safe disposal is available.

Waste paint re-use programs are also difficult for an industry body to pursue. As a result, in B.C., paint re-use levels have remained relatively constant throughout the lifespan of the program. Paint re-use programs require a large investment in sorting collected product and market development that an industry collection organization is not motivated to fully pursue. In the B.C. arrangement, this commitment serves to increase the costs for the PPC without bringing in any monetary return (i.e. possibility to reduce the "eco-fee"). Further, any paint that cannot be re-used limits the amount of paint that can be used to produce recycled latex products, a process that subsidizes the program. It is much simpler and cost-effective to recycle latex paint than to pursue re-use programs for an industry stewardship organization.

Similarly, using household waste paint to produce a recycled paint is limited in British Columbia. Because the paint industry is a relatively mature industry, the PPC will not work to produce a recycled paint product because this would involve marketing a product that competes with its own members for market share. The PPC policy is to never produce a recycled paint.

This arrangement, then, implies that a successful paint recycling component of waste paint management would become even more difficult to operate in B.C. than prior to the transfer of the take-back obligation to the PPC. Previously, a single enterprise would have encountered severe economic difficulty in collecting household waste paint and developing a recycled paint. However, at least theoretically, the raw material (waste paint) was accessible. Currently, with the PPC arrangement, that raw material is controlled by a party that has no interest in producing a recycled paint.

These types of motivation, coupled with a situation where targets are static, or difficult to measure such as in B.C., result in a program that has made much progress in the area of sustainable household waste paint management but will face difficult in moving to a fully sustainable program.

Overall, the British Columbia case study demonstrates that an industry take-back model for household waste paint is a foundation of a sustainable management system. However, in B.C., this foundation should be combined with other elements, namely targets, public education and environmental industry development to improve the program and move further toward sustainability.

5.3 Looking ahead: Issues for Manitoba

The following is a discussion of program performance issues that are unique to Manitoba that currently impact household waste paint management and must be considered if a sustainable household waste paint management program is to exist in the province.

Education

A broad-based education component is fundamental to a sustainable household waste paint management system. In Manitoba, this component is perhaps more necessary and important than in other jurisdictions to improve the overall environmental consciousness of the local population and is necessary for the success of household waste paint management in the province.

With relatively clean air and water and no significant pressure on landfills, a waste generating attitude persists to some degree in Manitoba. As an example, the recent rejection by Winnipeg City Council of a proposed fee/bag for garbage service is perhaps symptomatic of a larger attitude. That this proposed system was seen by many in the public as a simple tax grab does not bode particularly well for an eco-fee type of system for Manitoba.

In light of this attitude, the provincial government must be willing to accept the political risk associated with a change in household waste paint management that includes a levy or eco-fee. Regardless of who is assessing this cost to consumers, the government will be the one viewed as taking this money out of the pockets of consumers. The lengthy process that the Province has employed to study possible changes in

household waste paint management, including through a change in government may indicate political concern to effect changes.

This is not to say that the public will not accept a change to household waste paint management in Manitoba at some point, but emphasizes the necessity for comprehensive, ongoing education programs regarding household waste paint management to bring public opinion on-side, a critical factor for success. In addition, larger environmental education initiatives are necessary to bring household waste paint management into a larger waste management context and improve the overall environmental consciousness of Manitobans both prior to and during any change to the current system.

Collection in Manitoba

Many past studies, other authors, and even previous Department of Conservation facilitated consultations have suggested that so-called "toxic taxis" or scheduled curbside pickups as a feasible method to collect household waste paint in Manitoba. For example, this concept was initially supported by the Manitoba Consumer Association during Department of Conservation HHW meetings (Manitoba Household Hazardous Waste Task Group, 2000). However, with a large population density in Winnipeg and smaller densities in northern and rural regions, this type of collection system may be convenient for many Manitobans; the increased cost of providing equitable service to all Manitobans, not to mention significant inherent environmental and safety hazards makes this type of system untenable for Manitoba.

The B.C., Minnesota and the current Manitoba collection systems provide guidance in the design of optimal collection networks. Collection infrastructure must be flexible in order to be cost-effective and achieve collection rates that are significant. As an example, clearly, different collection infrastructure is necessary for the urban-Winnipeg region compared to sparsely populated northern areas. Regional planning and operation of the collection network is a form of household waste paint management that is sufficiently flexible to address these differences while maintaining the potential to achieve significant collection rates through a collection network that expands slowly, only as local needs are determined. With the determination of exact local needs, regional planning can determine the exact form of collection that is necessary, whether it be a permanent depot or simply a one-day, yearly collection event or joint agreement between municipalities to share household waste paint collection infrastructure.

In support of this type of collection infrastructure, the vision of the provincial Department of Conservation calls for an integrated waste management system that, where appropriate, will be coordinated and planned on a regional basis (Regional Waste Management Task Force, 1999). Working towards this, the province has proposed the formation of eight regional waste management districts. These regional waste management districts are a logical starting point for the development of an effective household waste paint collection infrastructure that is integrated with the province's other waste management activities and that grows according to local demand. Municipal involvement is required to designing an efficient, effective collection system.

Sustainable End-uses of Household Waste Paint.

Using collected household waste paint in a manner that is consistent with the concepts of sustainable development is one of the most difficult hurdles to overcome in moving toward a sustainable household waste paint management system. In Manitoba, this issue is further magnified by the province's geographic location and small population. To cope with these fixed variables, a sustainable waste paint management system in the province requires as a component, a local facility with the capacity to sort and bulk collected paint in a manner such that its value for sustainable end-use is preserved.

Without such a requirement, a foreseeable scenario is one in which paint is collected in Manitoba and then transported out of province for sorting and final processing and/or disposal. For example, the Winnipeg Paint Association (WPA) foresees its role in household waste paint management to be:

> *To receive bulk household paint and to find alternative uses for the reclaimed paint. In the association's view, Manitoba municipalities should be involved in depots, collection and transportation to a central depot* ***or to the PPC in B.C****. The paint industry will only take responsibility for paint products and not for other HHW. The WPA supports a legislative backdrop that creates a level playing field for waste paint management.*
>
> NOTE: Bold added for emphasis.

This may be a more cost effective method of disposal for collected paint in the province but will limit the overall sustainability of a local management system by limiting Manitobans access to recycled products. Increased costs associated with transportation to and from a jurisdiction that processes Manitoba's waste paint into useable products will decrease the competitiveness of these recycled alternatives for Manitobans when compared with virgin materials.

Beyond the unnecessary use of non-renewable fuel resources for transportation, shipping paint to B.C. impacts the quality of the Manitoba management program. In this case, the B.C. organization would be deriving benefit from the paint collected in Manitoba by increasing the production of PLP from waste paint collected in Manitoba. This may assist to lower the eco-fee in B.C. and allow greater and cheaper access to recycled paint products for B.C. consumers compared to Manitobans.

Local paint bulking capacity will improve the development of local markets for lower-order recycled paint products (e.g. PLP) thereby improving the overall quality of the local management program. However, Manitoba will still encounter difficulties in improving the feasibility of recycling to produce recycled paint. In essence, if it is feasible to produce recycled paint, the recycler must locate near large sources of waste paint and a large potential market for the recycled product. Manitoba's relatively small population and distance from other large markets is a hindrance to this form of recycling.

These economies of scale are difficult to overcome. It is difficult to foresee full-scale paint recycling occurring in Manitoba without a major shift in consumer behaviour toward environmental purchasing. Current solutions should focus on improving industry manufacturing practices and removing as many legislated barriers to paint recycling as possible. Ultimately, however, the demand for recycled paint is the key limitation to paint recycling in Manitoba. Therefore, a local facility in combination with developing demand, creating markets and overall environmental education and awareness are the necessary prerequisites for future development of a recycled paint industry in the province.

Beyond these tangible points in favour of developing local capacity, in a broad sense, transporting paint outside of Manitoba is not sustainable. The out-of-sight, out-of mind approach to managing waste paint is a concern from a more global perspective. For example, an Ontario company, Hotz Environmental, processes paint at a very low cost by exporting paint to less-developed nations in Africa. If this low cost is achieved at the expense of the receiving country's environmental quality, as is likely, utilizing these organizations may be more economically efficient for a Manitoba collection organization, regardless of who that organization may be, but, it is not the action of environmentally conscious global citizens/organizations.

This chapter has compared the household waste paint management systems in the three jurisdictions under consideration-Manitoba, Minnesota and British Columbia using identified performance measures and through discussion of fundamental funding arrangements. Having seen the weakness in the current Manitoba system, some unique Manitoba issues were discussed in consideration of changes that may be made in the province. The above information is combined with other points from the previous chapter and is the basis of the following Chapter that presents the conclusions of this research.

Chapter 6: Summary, Conclusion and Recommendations

6.1 Summary

Demand for changes to the way that household waste paint is managed in Manitoba has increased from homeowners, taxpayers, municipalities and environmental groups. Increasingly, these interested parties have realized that waste paint generated in homes is a significant portion of the municipal waste stream that can damage the environment, is an unnecessary waste of resources, and that more sustainable alternatives are available. In addition, the provincial government recognizes that the annual, ongoing cost of the current Manitoba HHW management program is not compatible with larger, provincial waste reduction and sustainable development goals.

As a framework for comparison and improvement in Manitoba, the following components of a sustainable management system for household waste paint were identified in Chapter 2:

- Household waste paint education program.
- Safe, efficient collection.
- Use of collected paint in a manner that reflects the waste management hierarchy.
- Assignment of responsibility for the program such that sustainable behaviour by the paint industry and consumers is promoted..

The implementation and ongoing management of these components requires supporting legislation that includes collection and capture rate targets, guidelines for education programs and a concise definition of "shared responsibility". Because waste paint generation rate calculations can vary and that in the long-term, lower collection rates

equate with success as less waste paint is generated, an ongoing communication mechanism/program is necessary between the province, municipalities and the paint industry to shape program goals and assess progress toward these goals. Ongoing study of the issue of household waste paint and the program in place is a necessity to avoid such stagnation.

Further, to ascertain current practices, three case studies have been undertaken to examine the relevant issues that relate to household waste paint management and to determine the steps necessary to deal with these issues such that future changes in Manitoba are sustainable.

The first case study, Manitoba, provides a baseline of the current situation in the province and examines a largely undeveloped collection of household waste paint. The current Manitoba household waste paint management system has minimal infrastructure capacity (1 depot), no significant education program, a low capture rate (5%) and limited re-use or recycling of household waste paint.

The second case study, Minnesota, a partnership between state and local government, represents a more developed, traditional approach to household waste paint management whereby local governments provide infrastructure for citizens to dispose of household waste paint. Minnesota, with 47 permanent or semi-permanent collection points, has a capture rate of 7% of household waste paint generated in the state. A broad approach to household waste paint management has been taken by including this waste stream within a larger HHW program while simultaneously focussing on developing the paint recycling industry through targeted, legislated, annual education programs and demonstration projects of the efficacy of recycled paint Overall, in Minnesota, many

county waste managers believe in the environmental value of the current level of collection. However, although many prerequisites are in place for the growth of a recycling industry for household waste paint, the overall high cost in Minnesota of the program is a significant detriment to the long-term success of the current arrangement.

The final case study, British Columbia, a paint industry based management model provides an attempt at applying the concept of product stewardship to household waste paint. Of the case studies, British Columbia was found to have the most positive performance measures-18.0 million ELC's of household waste paint collected from 1995-2000 and a capture rate of 23.4% in 2000 via 100 permanent collection depots. Importantly, B.C. has the highest percentage of sustainable end uses for collected paint. Over 86% of the paint collected in B.C. is either re-used or recycled. However, the program appears to have matured with collection rates reaching a plateau of 4 million ELC collected per year and the potential for future movement up the pollution prevention hierarchy is limited. The PCA has achieved recycling targets that have been set and not updated by the B.C. provincial government and improvement beyond these targets is not cost effective for the PCA. In addition, without specific reduction targets, because the PCA is an industry association, an underlying goal of the members of the stewardship organization is to maintain or increase non-recycled paint sales. This motivation limits the amount of waste paint reduction that can feasibly occur and can be expected for the future in B.C.

Based on this research, clearly, the source and level of funding that these programs have received is a fundamental difference between the cases and is a determinant of overall performance with regard to household waste paint management.

Simply spending public money on a collection program, as in Manitoba does not equate with a sustainable system. Similarly, spending an increased amount of money on a program, as in Minnesota, while slightly more beneficial, is not the key to a successful household waste paint management program

The transfer of responsibility to the paint industry and consumers for managing household waste paint is a key step in moving toward a sustainable system. However, this is not the final, conclusive step necessary for a jurisdiction to take toward sustainability. The B.C. program has transferred this responsibility and seen many positive performance measures as discussed above. However, pending the steps recommended below, the weaknesses that remain in the B.C. program can be avoided in the future for Manitoba.

6.2 Conclusion: Current Manitoba System

Based on this research, the current Manitoba arrangement is not a feasible alternative for sustainable household waste paint management nor does this system compare favorably with best practices in Minnesota and British Columbia. A capture rate of 5%, a recycling rate of 0% and little re-use of collected waste paint confirms that the current Manitoba situation is unacceptable from an environmental perspective. Further, the $425 000 spent annually for HHW management in the province still leaves some 95% of household waste paint generated with the potential to damage the environment. When compared with B.C. and Minnesota, Manitoba has the lowest capture rate, the lowest recycling rate, the lowest re-use rate, the least developed education initiatives and the least amount of infrastructure dedicated to household waste paint collection.

This research confirms the relative insignificance of the Manitoba collection operation, the overall unsustainability of the system and, importantly, the opportunity for improvement in Manitoba. If the current system were to persist, concerns related to waste paint in the environment and in storage would remain even with annual payouts from provincial coffers for a two day/month collection program.

Recommendations

With the goal of a sustainable management program for household waste paint as characterized by the components discussed in Chapter 2, a feasible system for Manitoba combines program elements from B.C. , elements from Minnesota and some required specific Manitoba actions. Transferring responsibility for waste paint management to industry and consumers is a significant step necessary for improvement both in efficiency and overall environmental performance. However, inherent limitations are reached if the program does not include clear goals and targets that are set, reviewed and re-set. Complementary, ongoing actions and programs besides industry responsibility, especially in the area of public education, must be undertaken by provincial and local government for a sustainable management program. The following are recommended for a sustainable management system for household waste paint for Manitoba.

Based on best practices in Minnesota, British Columbia and Manitoba, an improved household waste paint management system in Manitoba is characterized by the following:

1. Permanent collection facilities supported by mobile collection events. Other types of collection methods have been found to be unacceptable from an environmental,

health and safety perspective-see Chapter 2. The use of mobile collection events has been a useful support to permanent collection in B.C. to access smaller communities to provide an equitable level of service across the entire province. This form of collection is compatible with the population distribution of Manitoba.

In Manitoba, municipal sites and regional approaches should be employed to combine optimum collection rates with efficiency as a program grows in response to demand. British Columbia has failed to use municipal locations with the result being a separation of household waste paint management from other waste management activities at the cost of optimum collection rates.

2. Broad-based, ongoing household waste paint management education programs that include pre-purchase, point-of-purchase and post-purchase components. Other components include industry education programs and collection depot operator education programs. In Manitoba, this is a particularly important component of a future program and should be pursued through various media and within other educational initiatives. That is, household waste paint management education should be pursued both independently and as a portion of broader HHW and environmental education initiatives. The shape of the education programs should be legislated to ensure ongoing, relevant information dissemination and maintain the momentum of the program.

3. Sustainable uses of paints that are collected. Particular emphasis and input are required in Manitoba to promote higher order processes such as waste paint reduction and re-use and to develop markets for recycled paint products. In addition, a local

paint bulking facility would constitute a major step toward the sustainability of the Manitoba program. This would serve to facilitate higher-order paint recycling and assist in developing an environmental industry in the province. Local bulking capacity has resulted in an estimated saving of 6-25% in Minnesota for latex paint recycling that would also be possible for Manitoba and would increase the feasability of a recycled paint industry.

The following are recommended to achieve these goals and focus on the roles of relevant players in the Province:

1. **Manufacturers, distributors and vendors of paint should be made responsible for the collection, sustainable end-use and disposal of household waste paint.**

The transfer of responsibility for household waste paint away from government is essential for Manitoba to improve collection rates, fairly assign the costs of household waste paint management and ensure a program that is financially viable.

Both government programs under study are inefficient- Manitoba and Minnesota-both funded through government institutions- cost more than B.C. per unit collected and capture less household waste paint per person. If Manitoba were to set a capture rate target equivalent to the current B.C. capture level (25%) while maintaining the current arrangement whereby the Province funds collection, and assuming the current Manitoba level of efficiency, the overall cost of the program would be $1 995 000. Conversely, if Manitoba were to transfer responsibility for the cost of management to the paint industry and paint consumers, based on the efficiency achieved in B.C., the overall cost of a 25% capture rate program would be only $997 500. The second example whereby cost is

transferred away from the Province would see a capture rate that has improved five times over the current level (5% vs. 25%) with an increase in the overall cost of the program of only slightly more than two times the current amount ($425 000 vs. $997 500).

As further evidence for a transfer in responsibility, an initial British Columbia, government-run, collection system that operated in the early 1990's that was similar to the current Minnesota system was quickly scrapped because of high costs, poor collection rates and overall inefficiency. The current B.C. model run by the PCA has shown that increased efficiency is possible when an industry organization rather than a public organization is responsible for household waste paint management. This is achieved through more effective knowledge and control of the product (paint), more effective knowledge and control of the resultant waste stream and importantly a strong motivation to limit increased costs associated with a management program to all members of the distribution-retail chain, including consumers.

Beyond these practical examples, the widely accepted concept of "polluter pays" whereby the responsibility for waste management is placed on those who derive benefit from a product supports the transfer of the responsibility for waste paint management away from the province of Manitoba to the paint industry and paint consumers.

One element of this transfer in responsibility is financial. Simply, those who are responsible for household waste paint in the environment should be financially accountable for its management in Manitoba. This financial transfer will promote sustainable actions by industry by rewarding waste management activities that bring money back into the waste management system (i.e. accessing uses for waste paint that can subsidize collection) .

The question of whether responsibility should include the physical collection of waste paint as occurs in B.C. or whether industry should finance a third-party stewardship organization (e.g. M.P.S.C.) to physically collect household waste paint is more subtle. As noted in Chapter 4, a strictly industry-based collection organization is less likely to fully implement all aspects of the term stewardship (i.e. changing consumer behaviour to reduce paint sales), especially if profits and sales figures are at stake. Conversely, a stewardship organization (e.g. M.P.S.C.) that is funded by industry may lose technical expertise and efficiency if communication mechanisms that allow for the flow of technical information necessary for sustainable management of household waste paint are not in place. Without communication and targets, this type of arm's length arrangement between the collection administration and the responsible stewards is not ideal for promoting change by the paint industry to more sustainable practice.

Either arrangement can succeed if achievable, meaningful targets and guidelines for collection rates, capture rates, recycling rates, re-use rates and importantly reduction targets are fairly set, measured and enforced. A communication mechanism between the target-setting body (i.e. Provincial Department of Conservation), the collection agency and/or the provincial paint industry is fundamental to setting targets and accurately assessing progress toward these targets. Simply "making the polluter responsible" is not a sustainable solution. Just as simply, making the polluter responsible for a certain target for collection rate for waste paint is not in itself sustainable. Others must be involved in continuously defining and focusing exactly what this "responsibility" involves and in assessing if responsible parties are in fact meeting their obligations as defined by the goals and objectives of the program.

As a direct starting point, a group of interested parties should determine meaningful targets for capture rates. As a program matures, this group will at some point determine if decreasing collection rates imply the sustainable situation whereby less waste paint is being generated or if they are symptomatic of decreasing public interest in the program. Stagnant targets, goals and hence definitions of responsibility as has occurred in B.C. imply a stagnant management program.

2. Department of Conservation involvement in the end-use and disposal of non-paint HHW collected by the household waste paint collection infrastructure.

If the form of the management program is such that only household waste paint is the waste stream pursued, as is assumed in this research, the Department of Conservation should provide alternative, disposal options for non-paint HHW that will inevitably be collected through the operation of the program. It is unfair for consumers of paint to pay for the disposal of other waste streams. Similarly, turning away potentially hazardous (non-paint) materials from collection infrastructure as occurred in B.C. is unacceptable from an environmental perspective.

A likely source of provincial funding for the management of these products are the current monies that finance Miller's HHW collection program. Given that B.C. spent $200 000 in 1999 on non-program materials management, and that Manitoba's population is significantly less than that of B.C., only a portion of the $425 000 previously spent by the province on the HHW contract with Miller Environmental would be necessary to pay for the management of non-paint collected materials. By continuing to be responsible for this cost, the province has further incentive to work toward further

expansion of stewardship initiatives to include other HHW while acting in an environmentally responsible manner.

3. Municipal provision of municipal collection sites for household waste paint where appropriate and where inappropriate, involvement in the planning of collection infrastructure based on a regional approach.

Because of the large differences in size and population density of Manitoba municipalities, local governments should be involved in siting collection facilities so as to provide the greatest potential for collection rates. Municipal input, including financial support of collection infrastructure where possible, regarding local and regional issues and circumstances improves the opportunity for integrating household waste paint management with other waste management activities. Without municipal involvement and the inherent motivation to provide citizen convenience/service, household waste paint management may become separated from other waste management programs as occurred in B.C.. The result of this separation is infrastructure inefficiency at a cost to citizens/consumers and to the success of the household waste paint program and an overall waste management program .

For Manitoba, in many cases, sites on municipal yards or at landfills are the most desirable. In other cases, traditional Miller HHW locales may be the most convenient and most well known to residents and therefore may offer the locations with the highest potential capture rates pending municipal recommendations. Guidelines for collection infrastructure, including determining a funding arrangement for each case, prior to the

start of a program, is a key area for clear provincial policy and legislation that will ensure an equitable situation across the province and move a program forward.

4. Department of Conservation initiatives that support the highest orders of the waste management hierarchy and develop the demand side of the recycled paint market.

Household waste paint management requires Manitoba Department of Conservation involvement in the highest orders of the waste management hierarchy. As discussed in Chapter 5, higher order management processes for waste paint such as reduction and re-use, are difficult to achieve in an industry-stewardship arrangement for paint, especially if reduction and re-use targets are not in place and measured properly.

For paint re-use, the province should act as a liaison between the collection infrastructure and end-users. In addition, the province should provide an example to others as a leading re-user of waste paint. The Minnesota government has participated in a number of trials of re-used and re-cycled paint that provided an important message to both industries and consumers of paint that sustainable actions are desired and meet building standards. Alternately, the B.C. government's move away from re-using waste paint removes a large potential consumer of waste paint for the collection agency not to mention provides a signal to the PCA that paint re-use is not a priority in the province.

Proper and thorough analysis of provincial demands for paint, suitable storage sites and flexibility in demand would increase the amount of re-use of collected paint by government thereby setting an example for other organizations and even consumers. Internal targets, guidelines and policies may be necessary for the province to achieve this

goal. Similar leadership and programs will also be useful when and if recycled paint becomes available in the province. Initially, the province should focus on the necessity for local bulking capacity for waste paint as the initial step in developing the possibilities for recycled paint in Manitoba, in addition to providing realistic, fairly measured, up-to-date targets.

Beyond this, a note for the necessity for further involvement by the province in broader, national issues related to sustainable management of waste paint. For example, packaging and label changes would allow greater flexibility for consumers and improve the quality of the waste paint stream. Changes in packaging would be one method of limiting the amount of household waste paint subject to management. This type of change will require significant work on the part of the province in partnership with other government agencies and is an example of where provincial involvement is necessary to continue to work toward a sustainable program.

5. Involvement in a comprehensive household waste paint education program by the paint industry, provincial government and municipalities.

Limiting the responsibility for education to one party, for example, the paint industry, limits the target audience and also the potential message that can realistically be expected to be brought forth to Manitobans. Minnesota's legislated education program provides annual, up-to-date information regarding sustainable household waste paint management in the context of other waste management programs and concepts. In B.C., legislated industry required education programs allow for in-store, point of purchase education that public institutions cannot provide. Unfortunately, this material has become dated as the

program has aged and targets have been met. Therefore, a legislated annual program is desirable.

Municipalities are the traditional liaison between waste management activities and the public. This relationship can be used advantageously to provide the best information to the public about the program and to identify sustainable practices. Most citizens phone their municipal office when inquiring about waste disposal and this relationship should be exploited in the case of household waste paint. In addition, municipalities can provide a broad waste education program for all materials (including non-program materials) that industry cannot. Municipalities can reach more households more efficiently by coupling waste paint management education with other contacts that local governments have with its constituents. In addition, education that promotes waste paint reduction can be more effectively tackled by a party other than the paint industry and is easily combined with other waste reduction education campaigns.

The most effective area of education for paint industry involvement is point-of-purchase education. For example, a visible fundraising mechanism may be a deterrent to some consumers to buy excess paint. Further, a requirement for the inclusion of promotion of the B.U.D. concept to consumers is most effective prior to a paint sale.

For the provincial government, initiatives in the area of education should focus on providing overall waste management education and goals, implementing standards for collection infrastructure and in national initiatives that focus on packaging changes and industry changes to less hazardous products. Monies previously committed to HHW management would wisely be invested in education programs, development of recycling

and re-use efforts and ongoing analysis and research of any future household waste paint management program

References

Ames Paint Limited. 1991. *Recycled Paint-Information Package.*

Association of Municipal Recycling Coordinators. 1997. *HHW Public Awareness Survey-1996 Survey of People in Malls and Depots.*

British Columbia Ministry of Environment, Lands and Parks. 2000. *Post Consumer Paint Stewardship Program Regulation Annual Report by the Director.*

British Columbia Ministry of Environment, Lands and Parks. 2000. *Environmental Trends in B.C.* 2000.

British Columbia Ministry of Environment, Lands and Parks- Environment and Resource Management, Pollution Prevention and Remediation Branch. 1999. *Paint Recycling in B.C.*

British Columbia Ministry of Environment, Lands and Parks. 1999. *Business Plan 1999-2001: Strategies for a Healthy Environment.*

British Columbia Environment. 1993. Discussion Paper: *Household Hazardous Waste Strategy.*

British Columbia Environment. 1991. Program for Participation: *How B.C. is Managing Solid Waste.*

British Columbia Environment, 1991. Public Purchasing News-Volume 5, Number 8.

British Columbia Hazardous Waste Management Corporation. 1990. *Household Hazardous Products Guide.*

British Columbia Paint and Product Care. 2000. *Paint and Product Care Program Backgrounder.*

British Columbia Waste Management Act. Regulation 200/94. Post Consumer Paint Stewardship Program Regulation. 1997.

British Columbia Waste Management Act. Regulation 111/97. Post Consumer Residual

Stewardship Program Regulation. 1998.

Canadian Standards Association. 2001. *Z752 HHW Definition Standard (Public Review) Draft.*

Canadian Environmental Industry Association. 1995. *Proceedings of the 17th Annual Canadian Waste Management Conference.*

Canadian Environmental Regulation & Compliance News. 1999. November: pg. 1711.

Canadian Environmental Regulation & Compliance News. 1999. August: pg. 1656.

Canadian Paints and Coatings Association. 1999. *A Guide to the Management of Post Consumer Paint.*

Canadian Paints and Coatings Association, 1999. *CPCA House Call.* D. Murray, CPCA President.

Canadian Paints and Coatings Association, 1993. *Uses and Applications of Post-Consumer Paint.*

Canadian Recycling Directory, 1997 edition, Toronto.

City of Chicago-Department of Environment. 2001. *Keep Household Hazardous Waste Out of Landfills.*

Donohue, C. & Winters, B. 1990. *Paint Drop & Swap- Guidelines for Conducting Events.* Vermont Department of Environment,

Environment Canada. 1996. A Primer on Waste Management: The Environmental *Citizenship Series*. Minister of Supply and Services, Ottawa.

Environment Canada. 1996. *The State of Canada's Environment: 1996.* Minister of Supply and Services, Ottawa.

Garfinkel, S. 1994. New Life for Old Paint. *Technology Review.* February/March, pg. 16-17.

Gidney, N. 1992. Recycled Paint Works Like New. *Homes Magazine.* April 18, pg. 11.

Groundwork Wales, Wales Business Environment Centre. 2000. *South Wales Recycling Directory.*

Holmes, G. 1999. The Manitoba Product Stewardship Program: A Comparative Review and Assessment. Masters of Natural Resources Management Theses, Natural Resources Institute, University of Manitoba, Winnipeg.

Laidlaw Environmental Services Ltd. 1992. *Household Hazardous Waste Paint Reuse.*

Manitoba Household Hazardous Waste Task Group. Minutes of the Seventh Meeting. 2000.

Manitoba Household Hazardous Waste Task Group. Draft Report Household Hazardous Waste Management Committee, 2000.

Manitoba Household Hazardous Waste Task Group. Draft Stewardship Criteria for HHW: Program Expectations (Based on Used Oil Guideline), 2000.

Manitoba Household Hazardous Waste Task Group. Resource Conservation Comments On Issues Left Unresolved at the HHW Consulation. 2000.

Manitoba Household Hazardous Waste Task Group. Comments from Manitoba Eco-Network. 2000.

Manitoba Household Hazardous Waste Task Group. Minutes of the Third Meeting of the Manitoba Household Hazardous Waste Working Group. 2000

Manitoba Household Hazardous Waste Task Group. Minutes of the First Meeting of the Manitoba Household Hazardous Waste Working Group. 2000

Manitoba Household Hazardous Waste Task Group. 2000. *Draft Stewardship Critieria for HHW-Program Expectation Based on Used Oil Guideline.*

Manitoba Environment. 1997. *State of the Environment Report-Moving Towards Sustainable Development.*

Manitoba Environment. 1993. *Compliance Guide to Manitoba's Hazardous Waste Legislation.*

Manitoba Household Hazardous Waste Working Group. 1999. Unpublished minutes From the Fourth Meeting.

Manitoba Household Hazardous Waste Task Group. HHW Collection in Manitoba Presentation Notes. Dave Ediger, Manitoba Environment, 1999.

Manitoba Household Hazardous Waste Task Group. The Dangerous Goods Handling And Transportation Act Presentation Notes. Don Labossiere, Manitoba Environment, 1999.

Manitoba Household Hazardous Waste Task Group. Manitoba Legislation Affecting Waste Presentation Notes. Rod McCormick, Manitoba Enviroinment, 1999.

Manitoba Household Hazardous Waste Task Group. Overview of Manitoba Environment Processes Presentation Notes. Jerry Spiegel, Manitoba Environment, 1999.

Manitoba Household Hazardous Waste Task Group. Product Stewardship and Waste Management in Canada Presentation Notes. Gail Bebee, Retail Council of Canada, 1999.

Manitoba Regional Waste Management Task Force. 1999. *Final Report of the Manitoba Regional Waste Management Task Force.*

Manitoba Round Table on Environment & Economy. 1998. *What You Told Us... Solid Waste Minimization and Management.*

Manitoba Round Table on Environment & Economy. 1996. Workbook on Solid Waste Minimization and Management.

Manitoba Waste Reduction and Prevention Act.

Minnesota Pollution Control Agency. 2000. *Household Hazardous Waste.*

Minnesota Office of Environmental Assistance. 2000. *Report on 1998 Score Programs.*

Minnesota Pollution Control Agency. 2000. *HHW Waste Disposal.*

Minnesota Office of Environmental Assistance. 1998. *Report on 1996 Score Programs.*

Minnesota Pollution Control Agency. 1996. *HHW Operations Manual Summary.*

Morely & Associates, Puget Sound Paint and Coatings Association. 1989. Final Report: *Latex Paint Recycling Project.* Morely & Associates, Seattle.

Musick, M. 1991. Old Paint Learns New Tricks. *Biocycle.* May, pg.

OECD. 1996. Washington Waste Minimization Workshop*: Volume II Which Policies, Which Tools.* OECD, Paris.

Recycling Council of British Columbia. 1998. *Toxic Toolkit, a Media Kit and Reference Guide to HHW.*

Schaleger, N. 1994. *How Products are Made.* Volume I. Publisher, Detroit.

Sinclair, A.J. 1991. Environmental Decision Making at the Local Level: The Case of HHW Management in Ontario. PhD Thesis, University of Waterloo. Waterloo Ontario.

Sinclar, A.J. and Fenton, R.W. Stewardship for Packaging and Packaging Waste: Key

Policy Elements for Sustainability. *Canadian Public Administration.* Volume 10, No.1 pg. 123-148.

Smith, S. 1992. Recycled Paint Now a Reality in Central and Western Canada. *Coatings Magazine.* March/April, pg.

Stubbs, J. 1994. Recycled Paint Now a Reality in Central and Western Canada. *Coatings Magazine.* March/April, pg. 57-60.

Ontario Waste Diversion Organization. 2001. *Household Special Waste.* Powerpoint Presentation. Speakers: R. Hoare, K. Davin and J. Ralph.

Texas Natural Resources Conservation Commission. 2001. *Household Hazardous Waste.*

Turner, G.P.A. 1980. *Introduction to Paint Chemistry and Principles of Paint Technology.* Chapman & Hall, New York.

Ullman's Encyclopedia of Industrial Chemistry. 1992. Volume A18, New York.

World Commission on Environment and Development. 1987. *Our Common Future.*

Internet Based References

Amazon Environmental Website. 2000. Access at: http://www.nvo.com/amazon.

British Columba Department of Sustainable Resource Management Website: Access at: www.gov.bc.ca/srm/.

British Columbia Product Care Association Website: Access at: www.paintandproductcare.org/

Canadian Paints and Coatings Website. 1999. Access at: www. cpca.org

Environment Canada Website: Access at: www.ec.gc.ca/.

Manitoba Association for Resouce Recovery Website 2001: Access at: www.usedoilrecycling.com.

Manitoba Department of Conservation Website Access at: www.gov.mb.ca/natres.

Manitoba Tire Stewardship Program Website. Access at: www.skyweb.ca/~mbtirebd/web.htm

Minnesota Office of Environmental Assistance Website: Access at: www.moea.state.mn.us/.

Minnesota Pollution Control Agency Website. 2000 Access at: www.PPC.state.mn.us/netscape.shtml

Statistics Canada Website. 1999. Access at: www.statcan.ca

Personal Communications

Adams, D. 2001. Northern Paint Canada. Personal Communication.

Altman, A. 2001. Anoka County Minnesota. Personal Communication.

Boe, G. 2001 Northwest Minnesota Household Hazardous Waste Program, Personal Communication.

Benson, R. 2001. MARCC. Personal Communication.

Crandell, B. 2000. Consumer Association of Canada-B.C. Branch. Personal Communication.

Dittman, S. 2001. Scott County, Minnesota. Personal Communication.

Douglas, D. 2000. B.C. Department of Environment, Lands and Parks. Personal Communication.

Edmonds, R. 1999, 2000, 2001. Miller Environmental Inc. , Personal Communication.

Evans, K. 2000. B.C. Retail Association. Personal Communication.

Fernandes, T. 1999. Alberta Department of Environment. Personal Communication.

Godin, S. 1999. New Brunswick Department of Environment. Personal Communication.

Hodges, R. 1999. Saskatchewan Department of Environment. Personal Communication.

Iverson, P., 2000. Paint and Product Care Association. Personal Communication.

Kirchmeier, M. 2002. Cottonwood County Minnesota. Personal Communication.

Labossiere, D. 1999. Manitoba Environment. Personal Communication.

Lawerence, S. 2001. Pope County Minnesota. Personal Communication.

MacDonald, B. 2000. Paint and Product Care Association. Personal Communication.

MacKinnon-Peters, G. 1999. Prince Edward Island Department of Environment. Personal Communication.

Maxwell, T. 2000. B.C. Department of Environment, Lands and Parks. Personal Communication.

Moore, G. 2000. Miller Environmental, Personal Communication.

Morris, D. 2002. Crow Wing County Minnesota. Personal Communication.

McCormick, R. 1999. Manitoba Environment. Personal Communication.

Neate, D. 2001. Canadian Standards Association. Personal Communication.

Seagala, J. 2001, 2002. Amazon Environmental Inc. Personal Communication.

Uyeyama, H. 2000. City of Vancouver, Environmental Protection Office. Personal Communication.

Weaver, J. 2001. Mower County Minnesota. Personal Communication.

Wozniak, J. 2001. Ramsey County Minnesota. Personal Communication.

Yee, E. 1999. Manitoba Environment. Personal Communication.

Appendices

Appendix A: Common terms used in the paint industry.

The following glossary contains terms used commonly in the paint and coatings industry to describe the characteristics, usage and components of paints and coatings.

Acrylic: A synthetic resin used in high-performance water-based coatings. A coating in which the binder contains acrylic resins.

Adhesion: The ability of dry paint to attach to and remain fixed on the surface without blistering, flaking, cracking or being removed by tape.

Aerosol: A product that uses compressed gas to spray the coating from its container.

Air Cure: One method by which liquid coatings cure to a dry film. Oxygen from the air enters the film and cross-links the resin molecules. Also called "Air Dry" and "Oxidizing."

Alkyd: Synthetic resin modified with oil. Coating that contains alkyd resins in the binder.

Amide: A functional group which can act as an epoxy resin curing agent.

Anti-fouling Paint: Paints formulated especially for boat decks and hulls, docks and other below-water-line surfaces and structures to prevent the growth of barnacles and other organisms on ships' bottoms.

Binder: Solid ingredients in a coating that hold the pigment particles in suspension and attach them to the substrate. Consists of resins (e.g., oils, alkyd, latex). The nature and amount of binder determine many of the paint's performance properties--washability, toughness, adhesion, color retention, etc.

Body: The thickness or viscosity of a fluid.

Boiled Oil: Linseed (sometimes soya) oil that was formerly heated for faster drying. Today, chemical agents are added to speed up the drying process.

Butadiene: A gas which is chemically combined with styrene to create a resin used in latex binders, styrene-butadiene.

Catalyst: Substance whose presence increases the rate of a chemical reaction, e.g., acid catalyst added to an epoxy resin system to accelerate drying time.

Chalking: Formation of a powder on the surface of a paint film caused by disintegration of the binder during weathering. Can be affected by the choice of pigment or binder.

Clear Coating: A transparent protective and/or decorative film; generally the final coat of sealer applied to automotive finishes.

Coalescent Aid: The small amount of solvent contained in latex coatings. Not a true solvent since it does not actually dissolve the latex resins, the coalescent aid helps the latex resins flow together, aiding in film formation.

Coating: A paint, varnish, lacquer or other finish used to create a protective and/or decorative layer.

Colorant: Concentrated color (dyes or pigments) that can be added to paints to make specific colors.

Color Retention: The ability of paint to keep its original color. Major threats to color retention are exposure to ultraviolet radiation and abrasion by weather or repeated cleaning.

Corrosion Inhibitive: A type of metal paint or primer that prevents rust by preventing moisture from reaching the metal. Zinc phosphate, barium metaborate and strontium chromate (all pigments) are common ingredients in corrosion-inhibitive coatings. These pigments absorb any moisture that enters the paint film.

Diluent: A liquid used in coatings to reduce the consistency and make a coating flow more easily. The water in latex coatings is a diluent. A diluent may also be called a "Reducer," "Thinner," "Reducing Agent" or "Reducing Solvent."

Driers: Various compounds added to coatings to speed the drying.

Dry Colors: Powder-type colors to be mixed with water, alcohol or mineral spirits and resin to form a paint or stain.

Drying Oil: An oil that when exposed to air will dry to a solid through chemical reaction with air: linseed oil, tung oil, perilla, fish oil, soybean oil.

Earth Pigments: Those pigments that are obtained from the earth, including barytes, ocher, chalk and graphite.

Eggshell: Gloss lying between semigloss and flat.

Emulsion Paint: Coating in which resins are suspended in water, then flow together with the aid of an emulsifier. Example: latex paint.
Enamel: Broad classification of paints that dry to a hard, usually glossy finish. Most equipment-coating enamels require baking. Enamels for walls do not.

Epoxy: Extremely tough and durable synthetic resin used in some coatings. Epoxy coatings are extremely tough, durable and highly resistant to chemicals, abrasion,

moisture and alcohol.

Extender: Ingredients added to paint to increase coverage, reduce cost, achieve durability, alter appearance, control rheology and influence other desirable properties.

Gloss: The luster or shininess of paints and coatings. Different types of gloss are frequently arbitrarily differentiated, such as sheen, distinctness-of-image gloss, etc. Trade practice recognizes the following gloss levels, in increasing order of gloss: flat (or matte)-- practically free from sheen, even when viewed from oblique angles (usually less than 15 on 60-degree meter); eggshell-- usually 20-35 on 60-degree meter; semi-gloss--usually 35-70 on 60-degree meter; full-gloss--smooth and almost mirror-like surface when viewed from all angles, usually above 70 on 60-degree meter.

Hardener: Curing agent for epoxies or fiberglass.

Lacquer: A fast-drying usually clear coating that is highly flammable and dries by solvent evaporation only. Can be reconstituted after drying by adding solvent.

Latex-based Paint: General term used for water-based emulsion paints made with synthetic binders such as 100% acrylic, vinyl acrylic, terpolymer or styrene acrylic. A stable emulsion of polymers and pigment in water.

Lead: A metal, previously used as a pigment in paints. Discontinued in the early 1950s by industry consensus standard, and banned by the Consumer Products Safety Commission in 1978 because of its toxicity.

Linseed Oil: Drying oil made from the flax seed. Used as a solvent in many oil- based paints. "Boiled" linseed oil can be used to protect wood from water damage. Sometimes used as a furniture polish.

Marine Paint: Coating specially designed for immersion in water and exposure to marine atmosphere.

Mineral Spirits: Paint thinner. Solvent distilled from petroleum.

Naphtha: A petroleum distillate used mostly by professionals (as opposed to do-it-yourself painters) for cleanup and to thin solvent-based coatings. A volatile organic compound (see VOC).

Natural Resins: Resins from trees, plants, fish and insects. Examples: damars, copals.

Nonvolatile: The portion of a coating left after the solvent evaporates; sometimes called the solids content.

Oil Paint: A paint that contains drying oil, oil varnish or oil-modified resin as the film-forming ingredient. The term is commonly and incorrectly used to refer to any paint

soluble by organic solvents.

Paint: A coating including resin, a solvent, additives, pigments and, in some products, a diluent. Paints are generally opaque, and commonly represent the portion of the industry known as "architectural coatings."

Paint Remover: A chemical that softens old paint or varnish and permits it to be easily scraped off. Also called "stripper."

Penetrating Finish: A finish that sinks into the substrate, as opposed to settling on the surface.

Pigment: Insoluble, finely ground materials that give paint its properties of color and hide. Titanium dioxide is the most important pigment used to provide hiding in paint. Other pigments include anatase titanium, barium metaborate, barium sulphate, burnt sienna, burnt umber, carbon black, China clay, chromium oxide, iron oxide, lead carbonate, strontium chromate, Tuscan red, zinc oxide, zinc phosphate and zinc sulfide.

Polymer: Substance, the molecules of which consist of one or more structural units repeated any number of times; vinyl resins are examples of true polymers.

Polyvinyl Chloride: A synthetic resin used in the binders of coatings. Tends to discolor under exposure to ultraviolet radiation. Commonly called "vinyl."

Primer: First complete coat of paint of a painting system applied to a surface. Such paints are designed to provide adequate adhesion to new surfaces or are formulated to meet the special requirements of the surfaces.

Propellant: The gas used to expel materials from aerosol containers.

Resin: Synthetic or natural material used as the binder in coatings. Can be translucent or transparent, solid or semi-solid. Examples: acrylic, alkyd, copal ester, epoxy, polyurethane, polyvinyl chloride, silicone.

Semi-gloss Finish: Finish that has a low luster sheen. Semi-gloss paints are formulated to give this result (usually 35-70 degrees on a 60-degree meter).

Shellac: A coating made from purified lac dissolved in alcohol, often bleached white. The word lacquer is derived from the word lac, which describes the secretions of the lac beetle. This insect, found mainly in Asia, deposits its secretions on branches of trees and this crop is later harvested. The resin developed by the insects, in its original state, contains a red dye. This dye is separated from the resin by boiling in water. Next the residue resin, known as seed lac, is melted, strained, cooled and flaked and then becomes shellac.

Silicone: A resin used in the binders of coatings. Also used as an additive to provide

specific properties, e.g., defoamer. Paints containing silicone are very slick and resist dirt, graffiti and bacterial growth, and are stable in high heat.

Solids: The part of the coating that remains on a surface after the vehicle has evaporated. The dried paint film. Also called Nonvolatile.

Solvent: Any liquid which can dissolve a resin. Generally refers to the liquid portion of paints and coatings that evaporates as the coating dries.

Substrate: Any surface to which a coating is applied.

Titanium Dioxide: White pigment in virtually all white paints. Prime hiding pigment in most paints.

Turpentine: Distilled pine oil, used as a cleaner, solvent or thinner for oil-based and alkyd coatings.

Urethane: An important resin in the coatings industry. A true urethane coating is a two-component product that cures when an isocyanate (the catalyst) prompts a chemical reaction that unites the components.

Vehicle: Portion of a coating that includes all liquids and the binder. The vehicle and the pigment are the two basic components of paint.

Volatile Organic Compound: Organic chemicals and petrochemicals that emit vapors while evaporating. In paints, VOC generally refers to the solvent portion of the paint which, when it evaporates, results in the formation of paint film on the substrate to which it was applied.

Water-based: Coatings in which the majority of the liquid content is water.

Appendix B: **The British Columbia Post Consumer Paint Stewardship Program Regulation .**

Interpretation

1 In this regulation:
"brand-owner" means
(a) a person in British Columbia who is the owner or licensee of a trade mark under which a consumer paint product is sold or otherwise distributed in British Columbia, whether the trade mark is registered or not,
(b) a person who brings into British Columbia a consumer paint product for sale or other distribution in British Columbia, or
(c) an association representing one or more of the persons referred to in paragraph (a) or (b);
"consumer paint product" means
(a) latex, oil and solvent based architectural coatings, including stains and paints for commercial and homeowner use, whether tinted or untinted, and
(b) paints and stains, whether coloured or clear, sold in pressurized aerosol containers, but does not include unpressurized coatings formulated for industrial, automotive or marine anti-fouling applications;
"point of display" means an area of a seller's premises where consumer paint products are displayed;
"point of sale" means an area of a seller's premises where the transaction to purchase a consumer paint product takes place;
"post-consumer paint" means a consumer paint product and its container that is no longer wanted by the consumer for its original purpose;
"return collection facility" means a place for the return and short term storage or treatment of post-consumer paint;
"rural area" means an area that is not an urban area;
"seller" means a person who, as a wholesaler, distributor or retailer, sells or offers for sale consumer paint products including, without limitation, a bulk paint distributor, department store, grocery store, hardware supply store or drug store or any other person who sells or offers for sale consumer paint products;
"short term storage" means storage for a period of time not exceeding 6 months;
"stewardship program" means a program that
(a) provides for the collection, transportation and final treatment of post-consumer paint regardless of the original brand-owner or seller of that consumer paint product,
(b) incorporates the principles of pollution prevention through the implementation of the pollution prevention hierarchy by moving progressively from treatment or containment to recovery of energy, recycling or reuse, and
(c) complies with sections 6 (1) and 8;
"urban area" means a municipality that has a population greater than 25 000.
[am. B.C. Regs. 506/94, s. 1; 101/96, s. 1; 218/97, s. (a).]

Application of this regulation

2 This regulation applies to every brand-owner and seller of consumer paint products in British Columbia.

Duties of brand-owner

3 (1) A brand-owner must not sell, offer for sale or otherwise distribute, either directly or indirectly, a consumer paint product in British Columbia unless
(a) the brand-owner operates an approved stewardship program, or
(b) the brand-owner contracts with a person for the purpose of operating an approved stewardship program.
(2) A brand-owner, or the person operating an approved stewardship program on behalf of the brand-owner, must treat, contain, recover energy from, recycle or reuse all post-consumer paint within 6 months after collecting or receiving the post-consumer paint at the return collection facility.
[am. B.C. Reg. 506/94, s. 2.]

Approval of stewardship program

4 (1) For the purposes of section 3 (1), a brand-owner must submit a stewardship program to the director for review and approval.
(2) The director may
(a) approve the stewardship program,
(b) reject the stewardship program, or
(c) return the stewardship program to the brand-owner for further information.
(3) The director must provide the brand-owner with reasons if a stewardship program is rejected under subsection (2) (b).
[am. B.C. Reg. 506/94, s. 3.]

Report to the director

5 (1) Every brand-owner must, on or before March 31 in each year, provide to the director an annual report detailing the effectiveness of the brand-owner's stewardship program during the previous calendar year including, but not limited to, the following:
(a) the total amount of consumer paint products sold and post-consumer paint collected;
(b) the total amount of post-consumer paint processed or in storage;
(c) the percentage of post-consumer paint that was treated or contained, utilized for recovery of energy, recycled or reused, including efforts taken through marketing strategies or product and packaging reformulation of consumer paint products to reduce post-consumer paint and packaging waste;
(d) a description of the types of processes utilized to treat or contain, recover energy from, recycle or reuse post-consumer paint, including details of efforts to move up the pollution prevention hierarchy from treatment or containment to reuse;
(e) the location of return collection facilities;
(f) the location of any long term containment or final treatment and processing facilities for post-consumer paint;
(g) the types of consumer information, educational materials and strategies adopted under the educational and informational program of the brand-owner's stewardship program;
(h) the annual financial statements, as prepared by an independent audit, of the revenues received and the expenditures incurred by the brand-owner's stewardship program;

(i) the process of internal accountability used to monitor the environmental effectiveness of the program.
(2) On receipt of the report under subsection (1), the director may require that a brand-owner
(a) make amendments to the brand-owner's stewardship program as approved under section 4, or
(b) submit a new stewardship program to the director for review and approval.
(3) By April 30, July 31, October 31 and January 31 of each year every brand-owner must provide the director with information on the total post-consumer paint collected during the previous calendar quarter.
[am. B.C. Regs. 506/94, s. 4; 101/96, s. 2.]

Requirement to provide
educational and consumer information

6 (1) Every brand-owner must provide, free of charge to each seller of its consumer paint products, educational and consumer information respecting that brand-owner's consumer paint products sold from the seller's premises, which information informs consumers about the following:
(a) on and after January 1, 1995, the brand-owner's approved stewardship program;
(b) access to return collection facilities;
(c) the environmental and economic benefits of participating in the stewardship program.
(2) Every seller must provide, either at the point of display or point of sale of the consumer paint products, a place for the display of the information supplied by the brand-owner under subsection (1).
(3) The display of information must be clearly visible and the information must be made available free of charge in printed form in quantities sufficient that a consumer may remove a copy of the information from the premises.
(4) A brand-owner of a return collection facility that commenced post-consumer paint collection on or after April 1, 1996 must notify, within one year of commencing collection, the consumers to be served by the return collection facility as to the location and operating hours of that return collection facility.
(5) The notification under subsection (4) must
(a) be by advertisement, that is approved as to size and content by the director, in a newspaper serving the affected communities, and
(b) be based on the following schedule:
(i) one advertisement per week for 4 consecutive weeks;
(ii) thereafter one advertisement bi-weekly during the next 48 weeks.
(6) A brand-owner of a return collection facility that commenced post-consumer paint collection before April 1, 1996 must notify, before December 31, 1996, consumers to be served by the return collection facility as to the location and operating hours of return collection facilities in the community.
(7) The notification under subsection (6) must
(a) be by advertisement that is approved as to size and content by the director, in a newspaper serving the affected communities, and
(b) be based on the following schedule:
(i) one advertisement per week for 4 consecutive weeks;
(ii) thereafter one advertisement bi-weekly during the next 20 weeks.

(8) In addition to the other notifications required under this section, a brand-owner of a return collection facility must notify the public through a series of radio advertisements, the content and schedule of which must be approved by the director.

[am. B.C. Regs. 506/94, s. 5; 101/96, s. 3.]

Requirement of seller to post a sign

7 Every seller must post at the entrance to the seller's premises, the point of display or the point of sale at least one clearly visible sign with minimum dimensions of 56 cm by 43 cm and a minimum print font size of 24 points that is in a contrasting colour to the background colour of the sign and that provides information to the consumer respecting the location and hours of operation of the return collection facility that will accept a brand-owner's post-consumer paint.
[en. B.C. Regs. 506/94, s. 6; 101/96, s. 4.]

Requirements of the stewardship program

8 (1) Every brand-owner must, as a component of its stewardship program, do one of the following:
(a) provide, at the premises of each seller who sells the brand-owner's consumer paint products, a return collection facility;
(b) provide, at a location other than the premises of each seller who sells the brand-owner's consumer paint products, a return collection facility;
(c) contract, with a person who operates a return collection facility, for the use of that facility by a seller who sells the brand-owner's consumer paint products.
(2) The return collection facility described in subsection (1) (b) or (c) must be located
(a) not more than 4 kilometres by road from the seller's premises if the seller's premises are located in an urban area, or
(b) not more than 10 kilometres by road from the seller's premises if the seller's premises are located in a rural area.
(3) Despite subsection (2), the director may, on application to the director by the brand-owner or an agent of the brand-owner, waive the location requirements of that subsection to permit the use of a return collection facility that is located more than 4 kilometres by road from the seller's premises in an urban area or more than 10 kilometres by road from the seller's premises in a rural area.
(4) The director may consider the following when granting a waiver under subsection (3):
(a) the population of the market served by the seller;
(b) the accessibility and location of the closest possible alternative return collection facility to the seller's premises;
(c) the number of brand-owners who have, for the purposes of this regulation, contracted with the closest return collection facility;
(d) the number and location of other return collection facilities within a 10 kilometre radius of the seller's premises in an urban area or within a 20 kilometre radius of the seller's premises in a rural area;
(e) the number of waivers already granted to brand-owners within a 10 kilometre radius of the seller's premises in an urban area or within a 20 kilometre radius of the seller's premises in a rural area;
(f) any other factor that, in the opinion of the director, is relevant.

(4.1) A waiver granted under subsection (3) may be made in respect of one or more sellers of a brand-owner's consumer paint products.
(4.2) A brand-owner must provide and maintain each return collection facility listed in a waiver under subsection (3).
(5) Repealed. [B.C. Reg. 218/97, s. (b).]
(5.1) A return facility must
(a) be available, without charge, to any consumer who wishes to return post-consumer paint and containers, whether empty or not, regardless of the original brand-owner or seller of the consumer paint, and
(b) operate, and be available to the public, during regular business hours 5 days a week, one day of which must be Saturday.
(6) Despite subsection (5), the director may, on application to the director by the brand-owner or an agent of the brand-owner, waive the requirement for minimum hours and days of operation to permit the operation of a return collection facility during hours and days specified by the director.
(7) The director may consider the following when granting a waiver under subsection (6):
(a) the geographical area that the return collection facility serves;
(b) the population of the geographical area;
(c) the total amount of post-consumer paint previously received by the return collection facility;
(d) any other factor that, in the opinion of the director, is relevant.
(8) A waiver granted under subsection (6) may be made in respect of one or more return collection facilities operating under a stewardship program.
(9) Return collection facilities in operation on or after April 1, 1996 may not discontinue collecting post-consumer paint unless an alternative return collection facility is approved by the director.
(10) A brand-owner's stewardship program must, before January 1, 1998, ensure that 70% of the reusable and recyclable portion of the post-consumer paint collected during the previous year is reused or recycled.
(11) Brand-owners must submit to the director, on or before March 31, 1997, a testing procedure protocol that will determine the portion of post-consumer paint collected that is reusable and recyclable.
(12) The director may either approve, amend or reject the protocol submitted under subsection (11) and set the amount of post-consumer paint that the director considers is reusable and recyclable.
[am. B.C. Regs. 506/94, s. 7; 101/96, s. 5; 218/97, s. (b).]

Confidentiality

9 (1) Every person acting under the authority of this regulation must keep confidential all facts, information and records obtained or furnished under this regulation, except so far as public duty requires or this regulation permits the person to make disclosure of them or to report or take official action on them.
(2) The director may disclose the information regarding the effectiveness of a brand-owner's stewardship program provided in the annual report required under section 5.
(3) On application from the brand-owner, the director may withhold from the disclosure under subsection (2) sales and financial information that the director considers will place the brand-owner at a competitive disadvantage.

[am. B.C. Reg. 101/96, s. 6.]

Offence and penalty

10 (1) A person who contravenes section 3, 5 (1) or (3), 6, 7 or 8 (1), (2), (4.2), (5), (9), (10) or (11) commits an offence and is liable on conviction to a fine not exceeding $200 000.

(2) A person who is convicted of an offence under subsection (1), for contraventions of section 3, 5 (1), 6 (1) or 8 (1), (2), (4.2), (5) or (9), must stop selling, distributing or otherwise offering for sale consumer paint products in British Columbia until the contravention is remedied to the satisfaction of the director.

[am. B.C. Regs. 506/94, s. 8; 101/96, s. 7.]

Section Repealed

11 Repealed. [B.C. Reg. 101/96, s. 8.]

[Provisions of the *Waste Management Act*, R.S.B.C. 1996, c. 482, relevant to the enactment of this regulation: section 57]

Appendix C: **Members of the Manitoba HHW Management Committee.**

Jerome Mauws-Executive Director, Association of Manitoba Municipalities.
Ray Datt- President, Automotive Industries Association of Canada.
David Halton-President, Canadian Manufacturers of Chemical Specialties Association.
Richard Murry-President-Canadian Paints and Coatings Association.
Alain Perez-President, Canadian Petroleum Products Institute.
Tony Kuluk-Solid Waste Planning Engineer, City of Winnipeg.
Jenny Hillard, Vice-President-Issues, Consumers Association of Canada.
George Fleischmann, President, Food and Consumer Products Manufacurers of Canada.
Ann Lindsey, Executive Director, Manitoba EcoNetwork.
Murray Elston, President, Pharmaceutical Manufacturers Association of Canada.
Jan Westlund, President, Resource Conservation Manitoba.
Diane Brisbois, President, Retail Council of Canada.
Norm Brandson, Deputy Minister, Manitoba Environment.
Jim Ferguson, Manitoba Environment.
Dave Ediger, Manitoba Environment.
Serge Scrafield, Manitoba Environment.
Rick Sokolowski, Manitoba Environment.
Jerry Spiegel, Manioba Environment.
Bill Turnock, Manitoba Environmental Council.
Brian Acland, Canadian Diabetes Association.
Carolyn Garlich, Resource Conervation Manitoba.
Cyril Russel, Automotive Industries Association of Canada.
Dennis Adams, Northern Paint Canada Inc.
Don Labossiere, Manitoba Environment.
Ed Berry, Canadian Manufacturers of Chemical Specialties Association.
Gerry Manks, Canadian Tire Dealers Association.
Norma McCormick, Winnipeg Chamber of Commerce, SD Committee.
Rod McCormick, Manitoba Environment.
Steve Lupky, Town of Arborg.
Alcie Chambers, Manitoba Naturalists Society.
Paul Iverson, Paint and Product Care Association.
Jim Waters, Retail Council of Canada.
Gloria Desorcy, Consumers' Association of Canada (Manitoba Branch).
Ed Scherer, Manitoba Naturalist Society.
Susan Antler, Canadian Household Battery Association.
Susan Lessard-Friesen, Manitoba Pharmaceutical Association.
Kim Kelly, Rechargeable Battery Recycling Corporation
Peter Curry, Northern Paint Canada Inc.
Gail Bebee, Canadian Tire and Retail Council of Canada.
Gayle Mager, Automotive Trades Association of Manitoba.
Rick Heese, Cotter Canada Hardware.
Ron Benson, MARRC.