FIFTH PROGRESS REPORT

FROM THE TASK FORCE

OF THE

CANADIAN AUTOMOTIVE MANUFACTURING POLLUTION PREVENTION PROJECT

CVMA PROJECT

APRIL 1998

FOREWORD:

The Canadian Automotive Manufacturing Pollution Prevention Project (the CVMA Project) is a partnership between the automotive industry and government to promote pollution prevention. It was announced on May 29th, 1992 and is a cooperative effort between the participating members of the Canadian Vehicle Manufacturers' Association (CVMA), the federal Department of Environment (DOE) and the Ontario Ministry of the Environment (MOE). It is a component of the federal government's Great Lakes Pollution Prevention Initiative and the Ontario Ministry of the Environment's Pollution Prevention Strategy. Chrysler Canada Ltd., Ford Motor Company of Canada, Limited, and General Motors of Canada Limited were the first to engage in this activity in the Great Lakes basin in Canada. The CVMA Project has served as a model for other sectors, while demonstrating the proactive efforts being undertaken by the automotive industry to voluntarily reduce pollution at its source. The project title was recently changed from the Motor Vehicle Manufacturers' Association (MVMA) to the CVMA project due to a formal name change by the association.

ACKNOWLEDGEMENTS:

The Task Force Members wish to acknowledge the significant contributions made and the dedication to pollution prevention objectives of all the plant personnel of Chrysler Canada Ltd., Ford Motor Company of Canada, Limited, General Motors of Canada Limited and Navistar International Corporation of Canada. Without their hard work and dedication to the pollution prevention effort, the success and results demonstrated in our annual reports to date would never have been achieved. Their ongoing commitment will continue into the future and their efforts will positively position each company to meet the environmental management challenges ahead.

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1. Introduction

The Canadian Automotive Manufacturing Pollution Prevention Task Force is pleased to present its fifth progress report on the pollution prevention efforts of the participating member companies of the Canadian Vehicle Manufacturers' Association (CVMA). The project title was recently changed from the Motor Vehicle Manufacturers' Association (MVMA) to the CVMA project due to a formal name change by the association.

The format of the report was changed back to that of earlier reports which only reported on the progress which occurred over the period from an earlier report. Previous case studies can be found on Environment Canada's Green Lane under the URL address: www.cciw.ca/OR/glimr/metadata/poll-prev-auto1/intro.html

The report demonstrates the continued commitment by the participating CVMA member companies to pollution prevention and the ongoing reductions in the targeted substances which result from implementing pollution prevention plans within plant facilities. In this report, 25 new case studies are highlighted, each of which varies in the degree of complexity, cost, and implementation approach. The case studies are examples of the reductions resulting from various types of pollution prevention activities now underway and by no means represent a complete inventory of all pollution prevention actions.

The Canadian Automotive Manufacturing Pollution Prevention Project (the CVMA Project) was announced on May 29th, 1992. The CVMA project was renewed in 1994 with some revisions to its terms of reference and communications plan. The Memorandum of Understanding expired in September 1995. However, the companies and the governments have continued the project activities. The MOU is expected to be renewed in Summer 1998. It is a cooperative effort between the participating members of the Canadian Vehicle Manufacturers' Association (CVMA), the federal Department of Environment (DOE) and the Ontario Ministry of the Environment (MOE). It is a component of the federal government's Great Lakes Pollution Prevention Initiative and the Ontario Ministry of the Environment's Pollution Prevention Strategy. Chrysler Canada Ltd., Ford Motor Company of Canada, Limited, and General Motors of Canada Limited were the first to engage in this activity in the Great Lakes basin in Canada. The CVMA Project has served and continues to be a model for other sectors, while demonstrating the proactive efforts being undertaken by the automotive industry to voluntarily reduce pollution at its source.

The Project's goal is to produce a verifiable reduction of persistent toxic substances as well as other environmental contaminants of concern used, generated or released by the participating member companies of the CVMA.

A joint industry/government task force was established to oversee the Project. It is comprised of technical representatives from the CVMA, Chrysler Canada Ltd., Ford Motor Company of Canada, Limited, General Motors of Canada Limited, Environment Canada and the Ontario Ministry of the Environment.

2. Task Force Members

The current members of the Task Force are:

Chrysler Canada Ltd.	- Paul Hansen, Manager, Environmental Affairs (signatory)
The Department of Environment	- Tom Tseng, Manager, Toxics Prevention Division (signatory) - Brad Cumming, Head, Pollution Prevention and Mining
Ford Motor Company of Canada, Limited	- Ken Rossi, Manager, Plant and Energy Engineering (signatory) - Blake Smith, Manager, Environmental Quality
General Motors of Canada Limited	- Bruce Reid, Director, Office of the Environment (signatory) - Bryan Swift, Manager, Government Relations
Canadian Vehicle Manufacturers' Association	- Mark Nantais, President (signatory) - Yasmin Tarmohamed, Manager Policy Development
Ontario Ministry of the Environment	- Brian LeClair, Senior Advisor, Pollution Prevention Office (signatory)

3. Execution of the Memorandum of Understanding

The Canadian Automotive Manufacturing Pollution Prevention Project has been ongoing since May 1992. The signing of a Memorandum of Understanding (MOU) between the federal Minister of the Environment and the Ontario Minister of the Environment, the President of the Canadian Vehicle Manufacturers' Association (CVMA), and the chief executive officers from Chrysler Canada Ltd., Ford Motor Company of Canada, Limited and General Motors of Canada Limited formalized the first voluntary pollution prevention project in Canada. The project is managed by a joint government/industry task force which meets on a monthly basis to review progress and plan future activities. In September 1994, the original voluntary Memorandum of Understanding, was extended to September 30, 1995. Even though it expired in September 1995, the activities have continued on the voluntary pollution prevention project in the absence of a formal MOU. The original MOU and the 4th Progress Report can be found on Environment Canada's Green Lane Website. The URL address is www.cciw.ca/OR/glimr/metadata/poll-prev-auto1/intro.html. The MOU is currently being considered for renewal for an additional two-year time period to December 31, 2000. The draft MOU renewal addendum was posted on the Green Lane and the Ontario EBR for public comment for a 30-day time period in March 1998.

II. ADVANCEMENT OF P2 WITHIN THE AUTO COMPANIES:

The participating companies have undertaken further activities to promote and advance pollution prevention as part of their day-to-day operations within their respective organizations.

1. Chrysler Canada Ltd.

Pollution prevention is an economically beneficial means of reducing the risks and restrictions on Chrysler's business activities posed by the increasing number of stringent and complex environmental regulations. Pollution prevention embodies the principles of source reduction and the life cycle management of products and materials. The integration of pollution prevention and Life Cycle Management approach into business operations at Chrysler continues to be very beneficial.

Life Cycle Management (LCM) is a philosophy that integrates environmental and health and safety considerations with other business factors such as performance, quality and cost that are routinely balanced in the decision making process. This approach takes into consideration the cost of a product or material throughout its life cycle -- from acquisition, through processing, to disposal, including long term costs and liabilities -- rather than narrowly focusing on the initial purchase price. Chrysler's proactive pollution prevention and LCM programs will enable the company to achieve a cost-effective and sustainable environmental program and eliminate the need for

non-value added end-of-pipe controls. Reducing Chrysler's reliance on regulated materials will create advantages through operational flexibility and reduced costs, by avoiding protracted permitting processes and costly end-of-pipe controls which can impact timing and production schedules.

Environmental Policy

Chrysler Canada Ltd. has had an Environmental Policy in effect since 1989. In 1993, Chrysler updated that policy to include pollution prevention as one of the key elements. The purpose of the policy is:

> "To ensure all Chrysler business operations in Canada, as they relate to facilities, are conducted in a manner consistently demonstrating due regard for protection of the environment, fulfilling all legal requirements and demonstrating a level of environmental concern consistent with responsible corporate citizenship."

The individual elements outlined in the Policy are as follows:

- To communicate throughout Chrysler the importance of protecting the environment.
- To report environmental issues to management.
- To recognize environmental planning as a key element of the Business Plan.
- To actively pursue compliance.
- **To maintain active pollution prevention programs.**
- To maintain environmental control programs.
- To maintain a cooperative and responsible liaison with all levels of government to protect the environment.
- To maintain programs and resources to carry this Policy out.

A senior management Environmental Committee oversees the environmental activities, including pollution prevention at Chrysler Canada. The committee meets on a quarterly basis to report on progress, discuss new opportunities, and to prepare reports for the Board of Directors.

Each facility has an Environmental Coordinator who is given the production and non-

production part numbers containing the 65 targeted substances as identified by the corporate hazardous materials computer system. The number of substances at each facility ranges from 4 to 20. There are five facilities in Ontario, including three assembly plants. The plants are responsible for developing and implementing their own pollution prevention plans for their facilities.

Out of the initial 65 candidate substances, Chrysler Canada targeted PCBs, chlorinated compounds, cadmium, lead and mercury as priority substances for reduction or total elimination.

The National Pollutant Release Inventory (NPRI) facility releases have been reported to the Federal Government for the last four years - 1993, 1994, 1995 and 1996. Only 4 out of 5 facilities are required to report to the NPRI with the number of substances ranging from 2 to 18 in 1996.

Chrysler Canada is participating in the Federal Government's Accelerated Reduction or Elimination of Toxics (ARET) Program since 1994. Participation in ARET includes specific action plans for 6 substances on the ARET list. No substances were found to be on the program's A-1 list. Chrysler views ARET as a complementary program to the CVMA Pollution Prevention Project.

The total 1996 ARET emissions have been reduced from 115.5 tonnes to 44.6 tonnes or 61.4%. This decrease of 70.9 tonnes exceeds our overall initial target of 50.6 tonnes by the year 2000.

Chlorinated solvents have also been eliminated from all Chrysler Assembly Plants in Canada. New products containing such solvents are screened using a "restricted list" and prevented from entering through the central computerized purchasing system. All plant facilities, parts distribution centres and Chrysler-owned dealerships are encouraged to document success stories on pollution prevention and recycling.

Pollution prevention and life cycle management is supported within Chrysler by a hazardous materials screening system. At present, Chrysler targets 103 substances for elimination, reduction or substitution from both production and non-production materials, including the CVMA list of 65. Of these 103 substances, 26 are "restricted" substances targeted for elimination in all 1998 model year products and plant part number releases. Successful eliminations will be incorporated into current vehicles where parts redesign is not required. These 26 substances represent as much as 85% of Chrysler's burden for use, reformulation, controls and reporting. As substances are eliminated, others from the list of 103 will be targeted. The screening system is integrated into Chrysler's parts approval system and is being implemented in partnership with suppliers, who are responsible for certifying that products and parts meet Chrysler criteria for regulated and hazardous materials. An on-line

screening system allows suppliers access to Chrysler product and materials screening criteria creating a more direct opportunity for communication and participation in pollution prevention programs.

Chrysler encourages facilities to implement pollution prevention at the plant by aggressively seeking cost-effective opportunities for preventing and reducing the use of the 103 targeted substances. The primary strategy is to:

- Prevent or reduce pollution **at the source** wherever feasible.

- **Minimize** those wastes that cannot be eliminated.

- Implement environmentally responsible **reuse and recycling** if reduction at the source or minimization is not feasible.

- Use **treatment and disposal of wastes** in a sound environmental manner only for those wastes for which source reduction, minimization, reuse or recycling is not possible.

2. Ford Motor Company of Canada, Limited

At Ford Motor Company of Canada, Limited, an element of its overall Corporate Manufacturing Strategy includes a Manufacturing Environmental Strategy which has been developed to "prevent pollution at the early stages of the process and product development, address facility planning needs, and plan for recyclability". This is consistent with Ford's Environmental Policy. The policy, which has been in effect since 1989, was updated in 1996. The key elements of the policy include:

- sustainable economic development
- regulatory compliance is a minimum
- priorities based on achieving greatest anticipated practical benefit
- cost alone does not preclude alternatives
- continuous improvement.

The Policy itself is based on the following principles:

- **protection of the environment is an important consideration in business decisions**

  - consideration of environmental effects and future regulatory requirements is an early integral part of the planning process
  - plan and operate to minimize any adverse impact on the environment
  - incorporate objectives and targets

- prevention of pollution

♦ **protection of the environment is a company wide responsibility**

- management of each activity are responsible to make it a priority and commit the necessary resources
- employees at all levels are expected to carry out their responsibilities

♦ **adoption/enforcement or responsible, effective and sound laws, are in the Company's interest**

- participation with government officials, interested private organizations and the public
- provision of timely accurate information
- annual reporting to the Board

Ford's environmental policy is being further incorporated into operations using "A Guide to Manufacturing Environmental Leadership" which was issued in March 1994.

The Guide focuses on three key areas:

- Materials;
- Processes; and
- Ford Facilities

The strategy for materials is to reduce or eliminate the use of materials of concern. While the materials of concern represent a small fraction of wastes generated and released at Ford facilities, they are the target of most government regulations and public concern. Examples include halogenated and other organic solvents, PCBs, asbestos-containing materials and heavy metals.

Suppliers are also expected to adopt internal practices that are at least equivalent to Ford's and which comply with standards set for restricted use of specific materials.

The strategy for manufacturing processes has three components. They are as follows:

♦ **Consider the environmental impact early in the design of Ford products**

Product programs have specific environmental objectives considered from the start of design, and continuing throughout the life expectancy of the product equipment, or process. The objective is to ensure that, with a minimum of reviews and checks, a meaningful environmental impact assessment is completed at each appropriate stage of a product's development.

- **Consider the environmental impact early in manufacturing planning**

  An environmental impact analysis is made at each step of the manufacturing process. This includes an opportunity for using low-risk materials rather than materials of concern; reusing, recycling and reducing the amount of materials used; and, applying design for assembly/disassembly methodologies.

- **Develop ways to conserve and save energy**

  Specific energy efficiency improvement commitments and action plans have been expanded and are included in annual business plans and budgets. These commitments include programs for improved energy usage monitoring and energy-reduction initiatives.

For Ford facilities, the strategy includes contingency plans to handle potential environmental emergencies. The plans are reviewed annually and must address the following areas:

- spill prevention
- employee training
- accident control
- material containment

Ford's Manufacturing Environmental Strategy is expected to provide the following benefits to its operations:

- Environmental improvement
- Enhance the reputation and credibility with customers, the public, communities within which Ford does business, and with regulatory agencies
- Improve manufacturing flexibility by reducing the impact of regulatory restrictions
- Cost savings, reduced future liability, improve efficiency, and reduce the need for complex, costly pollution controls
- Improve recyclability of products.

By virtue of its Company Directive "Environmental Strategy, Planning and Implementation", each Ford plant/facility is required to have a Waste Minimization Program in place. The Waste Minimization Directive establishes a coordinated company program to reduce the volume, quantity, and toxicity of all wastes released to the environment. It also serves to minimize the use of designated materials of concern and the generation of waste or releases containing these materials, to the degree economically practicable. It is important to note Ford's definition of waste:

“Any material that is not used in a finished product is **waste**.”

Each plant/facility is required to document its ongoing pollution prevention/waste minimization program actions to reduce the volume/toxicity of materials and to maintain information on projects which have been implemented under the program. The programs and goals for waste minimization and recycling are to be included in business plans.

The annual Company environmental performance review of facilities includes pollution prevention/waste minimization.

Ford has revised its environmental management system, known as the Ford Environmental System, and is seeking ISO 14001 registration for all of its Canadian manufacturing facilities by the end of 1998. Four facilities are currently registered representing several firsts: Oakville Assembly Plant (first assembly plant in North America), Windsor Aluminum Plant (first casting plant in the world), Markham Electronics (first electronics plant in Canada) and Essex Aluminum Plant. The Ford Environmental System includes a global procedure addressing Prevention of Pollution/Waste Minimization. These activities are subject to third party independent audit, on an ongoing basis, as a part of being registered.

In order to assist facilities, each has been provided a Guidebook and Record entitled “Waste Minimization/Pollution Prevention”. It includes the Company guidebook “Road Map to an Effective Waste Minimization Program” as developed by the Corporate Hazardous Waste Minimization Committee.

The Company has also developed two training modules to facilitate the pollution prevention/waste minimization team process which uses the “Road Map” as the basic text. For materials targeted for reduction, financial criteria (e.g. return on investment) for project approvals are reduced. The program has been expanded from North America to become a global program.

Ford has launched a new Design for the Environment training program to increase the knowledge and awareness of product engineers concerning the environmental effects of their design decisions.

Ford continues to use its Green Committee (a group made up of senior management personnel, facility operations and divisional environmental representatives, co-chaired by the CEO and the Director of Environment, Energy and Vehicle Safety) for two-way communication on pollution prevention activities. This activity has been supplemented by annual Ford/Canadian Auto Workers environmental meetings much of which focus on pollution prevention activities.

Ford highlights pollution prevention initiatives in its annual Environmental Report and electronically in the Environment section of the Ford web site on the Internet, as well as internal bulletin boards.

3. General Motors of Canada Limited

General Motors of Canada has had a long standing commitment to Environmental Excellence. Traditional approaches have in recent years been augmented with pollution prevention initiatives to reduce the impact of General Motors operations upon the environment. Recognition of society's increasing interest in environmental issues resulted in General Motors Corporation taking its internal policies, reformulating them and releasing them publicly as the company's environmental principles in March of 1991. They were concurrently adopted by General Motors of Canada Limited and are as follows:

1. "We are committed to actions to restore and preserve the environment.

2. We are committed to reducing waste and pollutants, conserving resources and recycling materials at every state of the product life cycle.

3. We will continue to participate actively in educating the public regarding environmental conservation.

4. We will continue to pursue vigorously the development and implementation of technologies for minimizing pollutant emissions.

5. We will continue to work with all governmental entities for the development of technically sound and financially responsible environmental laws and regulations.

6. We will continually assess the impact of our plants and products on the environment and the communities in which we live and operate with a goal of continuous improvement."

In 1993 General Motors reaffirmed its commitment to the environment with the "Coalition for Environmentally Responsible Economies" (CERES) mutual endorsement.

General Motors of Canada Limited continually reviews its Environmental Management System to ensure that it reflects the current developments in the environmental field and to recognize changes in corporate policies, regulations and international standards.

In order to provide employees, shareholders, the general public and other interested stakeholders with information concerning General Motors environmental performance and commitment to the above principles, the Corporation initiated an annual environmental report with the first edition issued in 1994 and the most recent report based on 1996 data was released in November 1997. This report outlines the policy, programs, and commitment to environmental excellence and highlights the successes and challenges in attaining that standard.

As a means of ensuring that staff are properly trained to provide the necessary technical support for the various programs, General Motors of Canada Limited updates and delivers on a regular basis an extensive environmental training program for its 40 environmental officers.

Other educational activities include the development and distribution of an environmental handbook for each first line supervisor in GM Canada's facilities to enhance their knowledge of environmental issues, regulations and policies. GM's supplier development team works with suppliers to assist them in identifying waste of either materials and energy in their operations. General Motors of Canada Limited also initiated the "Global Rivers Environmental Education Network" program at three Oshawa Schools during 1996/1997. This program included the joint development of a curriculum and provides the students with an opportunity to learn more about the importance of local watersheds, to carry out tests of these waters and to share this information with other students around the world. This program is being expanded for the 1997/1998 year to include additional schools and classes.

General Motors of Canada Limited has an environmental audit program which ensures that all manufacturing and significant non-manufacturing facilities are audited using a combined internal/external compliment of auditors. These audits assess the plants' compliance with both legal obligations and corporate standards. Where appropriate, plans are developed and implemented to address any deficiencies and to enhance current procedures. These audits also serve to identify opportunities for pollution prevention initiatives and risk reduction.

General Motors also continues to pursue a number of pollution prevention programs including the "We Care" Program which addresses a wide variety of wastes in both manufacturing and office settings. This program involves an annual audit of wastes generated at each of its facilities to establish the origin of the waste with an objective of developing methods to either reduce the amount of waste generated or alternatively find a way to re-use or recycle the material. Ideas developed are then shared among plants to leverage the benefits.

A new packaging design and recycling specification has permitted a significant reduction in packaging waste to landfill through the use of returnable containers, and

recycling of corrugated materials, plastic sheeting and protective dunnage. A program has also been initiated to recover protective packaging components and return these to the supplier for re-use or recycling. Two hundred and forty three tonnes of plastic packaging was re-directed from landfill in 1996, a 40% improvement over 1995. A system to collect “shrink-wrap” has been instituted in the car assembly facilities in Oshawa and has resulted in the recovery of 150 tonnes of material during 1996. These programs have been supplemented with office recycling of paper, pop cans, printer cartridges, diskettes and batteries.

General Motors of Canada Limited have signed onto the Voluntary Climate Challenge Program and will be reporting annually on its progress in ensuring that Greenhouse gas emissions are maintained at or below 1990 levels by the year 2000.

A program has also been developed to address the “PCB” based transformer equipment which has been in use in some of its facilities. A planned replacement program is underway to retrofit or replace this equipment over the next three years.

The “CVMA Pollution Prevention Project” is a focal point for reductions of this nature. In utilizing the environmental engineers at each plant location, they are able to search out opportunities to reduce chemical usage and build a database upon which others can draw. A computerized system, using “MSDS” data, is used to screen all existing and any new proposed products for substances of concern. This database provides each plant with a listing of products by targeted substance in use at that facility thereby facilitating electronic searches and substitutions. A chemical management guide has been developed and is available for use by the environmental and process engineers to assist them in selection of materials.

Chemical management systems are in place, under development, or forecast for each of the company’s seven (7) locations. These systems are reducing both the number and volumes of products required to support a given level of production and simplify the work involved in screening, substituting and disposing of chemicals of concern. General Motors has worked closely with potential suppliers of chemical management systems and have built into its specifications, requirements for screening, chemical use reduction and tracking. Similarly, they are working closely with paint and other suppliers to reformulate products which have the potential to adversely affect the environment.

General Motors of Canada Limited completed the destruction of its stored PCBs in October 1997 with the use of the ELI Eco-Logic technology. This was the first private sector program in Ontario to destroy a broad spectrum of PCB contaminated materials and by demonstrating the effectiveness of this technology will lead the way for further destruction of PCBs in the future.

Through these initiatives, together with the development of cleaner, more fuel efficient vehicles with increased recyclable content, and other programs which involve support and educational components for employees and the community at large, General Motors of Canada strives to fulfill its ongoing commitment to the environment.

III. DEVELOPMENT AND IMPLEMENTATION OF P2 PLANS

1. List of Targeted Substances and 1997 Inventory Results

(a) Initial List of Targeted Substances:

The initial list of 65 substances targeted under the CVMA Project includes non-halogenated hydrocarbons, halogenated hydrocarbons, metals and pesticides (Table 1). This list represents substances that have shown repeated evidence of contamination of water, biota and/or sediments of the Great Lakes system and are also known to be persistent, bioaccumulative and/or toxic to aquatic or terrestrial life. The agreement to target this list was reached in October 1992.

Table 1. Initial Candidates for Reduction/Elimination

Halogenated Hydrocarbons	Non-Halogenated Hydrocarbons	Metals	Pesticides
Dichlorobenzenes[++]	Benzene[++]	Antimony	Aldrin
Ethylene dibromide	2,4-Dinitrotoluene[++]	Arsenic[++]	Chlordane
Hexachlorobenzene[++]	Ethylbenzene	Beryllium[++]	DDD
Hexachlorobutadiene	Isophorone	Cadmium[++]	DDE
Hexachloroethane	Nitrobenzene	Chromium[++]	DDT
Methyl chloride	Phenol[++]	Copper[++]	Dieldrin
Methylene chloride[++]	Phthalates:	Lead[++]	Heptachlor
Nonachlor	butyl benzyl phthalate	Mercury	Lindane
Octachlorostyrene[++]	di-n-butyl phthalate	Nickel[++]	Mirex
Pentachlorobenzene	diethyl hexyl phthalate[++]	Selenium	Oxychlordane
PCBs[++]	diethyl phthalate	Silver[++]	Toxaphene
Tetrachlorobenzene	dimethyl phthalate	Zinc[++]	
Tetrachlorobenzodioxin[++]	Polyaromatic Hdyrocarbons (PAHs)		
Tetrachlorobenzofuran[++]	acenaphtalene		
Tetrachloroethylene[++]	acenaphthene		
Trichloroethylene[++]	anthracene[++]		
Trichlorophenols	benzo(a)anthracene[++]		
	benzo(a)pyrene[++]		
	benzo(k)fluoranthene[++]		
	chrysene[++]		
	fluorene		
	indeno(1,2,3)pyrene[++]		
	napthalene		
	phenanthrene[++]		
	pyrene[++]		
	Terphenyl		
	Toluene		

Note:
[++] = ARET Substance

(b) List of Substances added in 1994

In 1994, the task force agreed to add the list of substances identified under the Canada-Ontario Agreement (COA) to the existing list of targeted substances. The COA list identified two lists of substances (Tier I and Tier II substances) for voluntary and/or regulatory action. Of the 36 COA substances, 18 were already part of the initial list of 65 (Table 2).

Table 2: Substances Added to the CVMA List from the COA Tier I and Tier 2 Lists

COA Tier I and Tier II Substances Added to CVMA P2 Project			
Halogenated Hydrocarbons	**Non-Halogenated Hydrocarbons**	**Metals**	**Pesticides**
Hexachlorobenzene†,††	PAHs:(2)	Cadmium†,††	Aldrin††
PCBs†,††	anthracene†,††	Lead†,††	Chlordane††
Pentachlorophenol††	benz(a)anthracene†,††	Mercury†,††	DDE††
Tetrachlorobenzodioxin†,††	benzo(b)fluoranthene††	Tributyl tin††	DDT††
Tetrachlorobenzofuran†,††	benzo(j)fluoranthene††		DDD††
1,4-dichlorobenzene†,††	benzo(k)fluoranthene†,		Hexachlorocyclohexane††
4,4'-methylenebis(chloro aniline) ††	benzo(g,h,i)perylene††		Mirex††
3,3'-dichlorobenzidine††	benzo(a)pyrene††		Toxaphene††
Octachlorostyrene†,††	benzo(e)pyrene††		Dieldrin††
	chrysene†, ††		
	dibenzo(a,j)acridine††		
	dibenzo(a,h)anthracene††		
	7H-dibenzo(c,g)carbazole††		
	dibenzo(a,i)pyrene††		
	fluoranthene††		
	indeno(1,2,3)pyrene†,††,(1)		
	perylene††		
	phenanthrene†,††		
	pyrene†,††		
	Dinitropyrene(10)		

Note:
† = substances on initial CVMA list of 65; all isomers are not listed
†† = ARET substance
(1) = all isomers are not listed (also applies to dioxins and furans)
(2) = all PAHs are not listed

(c) Additional Substances for which Inventory Scan Conducted in 1997

In the absence of a formal MOU, the task force discussed the possibility of conducting an inventory scan on substances listed on Schedule 1 of the Canadian Environmental Protection Act (CEPA) as at January 1995 and for those substances which were deemed toxic under the PSL1 assessment. It was agreed that scans would be conducted where Chemical Abstract Service (CAS) Numbers were available and that only those substances found in the inventory results would be added. The CEPA Schedule 1 and PSL1 toxics are presented in Table 3.

Table 3: Additional Substances Inventoried in 1997[(1)]

CEPA Schedule 1	PSL 1 Toxic
Chlorobiphenyls (PCBs)¤	1,2-dichloroethane
Dodecachloropentacyclo(5.3.0.$0^{2.6}$0$^{3.9}$0$^{4.8}$)decane	3,3'-dichlorobenzidine¤
Polybrominated biphenyls	Benzene¤
Chlorofluorocarbon (CFC)	Benzidine
Polychlorinated terphenyls	Bis(chloroethyl)ether
Asbestos	Bis chloromethyl methyl ether
Lead¤	Chlorinated paraffins
Mercury¤	Chlorinated wastewater effluents
Vinyl chloride	Creosote impregnated wastes
Bromochlorodifluoromethane	Dichloromethane¤
Bromotrifluoromethane	Dioxins¤
Dibromotetrafluoromethane	Effluents from pulp & paper using bleach
Fuel containing toxic substances that are dangerous goods within section 2 of the TDGA	Ethylhexyl phthalate¤
Dibenzo-para-dioxin	Furans¤
Dibenzofuran	Hexachlorobenzene¤
Polychlorinated dibenzo-para-dioxins¤	Hexavalent chromium compounds¤
Polychlorinated dibenzofurans¤	Arsenic (inorganic compounds) ¤
Tetrachloromethane (carbon tetrachloride)	Cadmium (inorganic compounds) ¤
1,1,1-trichloroethane[(2)]	Fluorides (inorganic)
Bromofluorocarbons	Nickel (oxidic, sulphidic, soluble inorganic compounds) ¤
Hydrobromofluorocarbons	PAHs¤
Methyl bromide	Refractory ceramic fibres
	Tetrachloroethylene¤
	Trichloroethylene¤

Note:
[(1)] = substances list as of January 1995; some of the PSL1 toxics have now been added to CEPA Schedule 1
¤ = substances on initial list of 65 and COA substances
[(2)] = also a PSL1 toxic which has been now been added to Schedule 1

(d) Inventory Results from 1997

In 1997, inventory scans were conducted by the participating companies for the initial list of 65 substances and the COA Tier I and Tier II list substances targeted for reduction and/or elimination in the project. The CEPA Schedule 1 substances as at January 1995 and the PSL1 Toxics were also inventoried. The completed inventories for 1997 found 25 substances of the targeted list as used, generated or released in the companies' manufacturing operations. The scan of the CEPA substances, identified 7 substances (which were not part of the previous list).

Table 4: Substances found in CVMA Facilities in 1997

Halogenated Hydrocarbons	Non-Halogenated Hydrocarbons	Metals	CEPA Schedule 1 or PSL1 Toxics
Dichlorobenzenes Methylene chloride Polychlorinated biphenyls (PCBs) (1) Tetrachloroethylene (2) Trichloroethylene (2)	Benzene (2) Ethylbenzene Phenol Phthalates: butyl benzyl phthalate diethyl hexyl phthalate (2) dimethyl phthalate Polyaromatic Hydrocarbons(3) napthalene Toluene	Antimony Arsenic (2) Beryllium Cadmium (2) Chromium (2) Copper Lead (4) Mercury (4) Nickel (2) Selenium Silver Zinc	Asbestos (5) Bromochlorofluoromethane Bromotrifluoromethane 1,2-dichloroethane Chlorinated paraffins Fluorides (inorganic) Refractory Ceramic Fibres (6)

Note:
(1) - PCBs are not used; they are found in old equipment such as transformers, etc.
(2) - Also a PSL1 Toxic substance
(3) - PAHs were also found in the inventory for PSL1 Toxics; PAHs are already targeted under initial list of targeted substances and COA
(4) - Also a CEPA Schedule 1 substance
(5) - Asbestos is health and safety concern rather than an environmental one; extensive health and safety legislation already exists to address asbestos
(6) - Refractory ceramic fibres are used in the manufacturing processes (e.g. casting operations); no suitable alternatives are currently known; of concern from a health and safety perspective

The inventory results from 1993, 1995 and 1997 can be found in Appendix I.

2. List of Pollution Prevention Project Facilities

The following Ontario facilities of the three participating companies fall under the Memorandum of Understanding, many of which, have submitted the case studies which appear in this report:

Chrysler Canada Ltd.

- Bramalea Assembly Plant, Brampton
- Windsor Assembly Plant, Windsor
- Pillette Road Truck Plant, Windsor
- Ajax Trim Plant, Ajax
- Etobicoke Casting Plant, Toronto
- Mississauga Parts Distribution Centre

Ford Motor Company of Canada, Limited

- Oakville Assembly Plant, Oakville
- Ontario Truck Plant, Oakville
- St. Thomas Assembly Plant, St. Thomas
- Windsor Engine Plant One, Windsor
- Essex Engine Plant, Windsor
- Windsor Casting Plant, Windsor
- Essex Aluminum Plant, Windsor
- Windsor Aluminum Plant, Windsor
- Windsor Engine Plant, Windsor
- Ford Electronics Manufacturing Corporation, Markham
- Customer Service Organization, Bramalea

General Motors of Canada Limited

- Oshawa Car Assembly Plant, Oshawa
- Oshawa South Stamping Plant, Oshawa
- Oshawa Tri-Link, Oshawa
- Oshawa Truck Assembly Centre, Oshawa
- Oshawa Battery Plant
- St. Catharines Foundry, St. Catharines (ceased operations in 1995)
- St. Catharines Components Plant, St. Catharines
- St. Catharines Engine/Welland Avenue Plants, St. Catharines
- London Diesel, London
- National Parts Distribution Centre, Woodstock
- St. Therese, Quebec Assembly Plant
- Windsor Transmission Plant

Also, another CVMA member company, Navistar International Corporation Canada's Chatham Assembly plant has chosen to submit a pollution prevention case study for this report.

IV. CASE STUDIES

The case studies reported herein are examples of the type of activities underway in each of the facilities and are by no means a full account for all the pollution prevention activities completed, or underway within the companies. The companies have used the pollution prevention strategy which is based on the principles of total quality environmental management and continuous improvement. This step-by-step team approach engages internal company representatives and in many cases, external resources such as suppliers, who work together at the earliest stages of a project to collect data and identify possible options to reduce or eliminate the targeted

substances or processes. The annual reduction quantities of substances in use for this reporting period and to-date are provided in Table 5.

The companies have used a reporting format developed by the Task Force for reporting on their site specific pollution prevention projects. The Task Force used these reports to prepare the project profile tables which appear in the case studies section of the report. The project summaries provide information on plant projects, target chemicals, objectives, project description, expected or achieved reductions, and advantages including cost savings.

The companies have each reported 8 new case studies for a total of 24 case studies. Also included is an additional case study from a non-signatory CVMA member company. Table 6 summarizes these case studies, identifying the substance being targeted, the media addressed and the reductions achieved and any advantages such as cost savings. More detailed information on each of these case studies is provided in Appendix II.

Table 5. Reductions Achieved in New Case Studies by Substance

Substance	Reduction/ Elimination reported in previous 65 case studies (tonnes)	Reduction/ Elimination reported in current 25 case studies (tonnes)
Halogenated Hydrocarbons		
Dichlorobenzene	0.20	0.07
methylene chloride	201.01	
PCBs	63.81	0.01
total	265.02	0.08
Non-Halogenated Hydrocarbons		
benzene	0.02	
ethylbenzene	0.03	
phenol	3.90	
toluene	235.39	5.21
total	239.34	5.21
Metals		
antimony		0.03
arsenic		0.85
beryllium		0.28
chromium	24.46	2.09
copper	23.70	74.58
lead	170.93	27.20
mercury		0.27
nickel	1.39	
zinc	12.53	94.94
total	233.01	200.24
COA Substances		
methylenebis(phenylisocyanate)		76.80
total	0.00	76.80
Other Substances		
acetone	58.00	
aluminum	750.00	38.90
ethanol	10.00	
CFCs	1.18	
cutting oils	10.20	

Table 5. Reductions Achieved in New Case Studies by Substance (cont'd)

Substance	Reduction/ Elimination reported in previous 65 case studies (tonnes)	Reduction/ Elimination reported in current 25 case studies (tonnes)
hydrochloric acid	371.70	
methanol	9.00	14.00
methyl ethyl ketone	52.00	70.00
methyl isobutyl ketone	23.00	2.00
n-butyl alcohol	10.70	
oily water	22.70	
lime	10.90	
paint	122.10	
paint sludge	612.27	70.00
PCB waste	825.00	45.00
phosphorus	1.00	
salt flux	10224.60	
sodium hydroxide	281.50	
industrial solid waste	130026.70	177993.85
styrene	1500.00	
1,1,1-trichloroethane	14.10	
xylene	466.60	28.00
WTP sludge	800.80	2500.00
VOCs	2523.09	1125.10
hazardous waste	1046.41	386.00
chlorine		1.40
total	149785.55	182305.55
grand total	150283.58	182587.88

TABLE 6. SUMMARY OF SELECTED NEW POLLUTION PREVENTION CASE STUDIES

Plant Pollution Prevention Project	Targeted Substance	Results and Advantages	Media Addressed
Conversion of Waterborne Base Coat Paints (Chrysler, p.42)	Toluene, methanol, xylene, methyl isobutyl ketone (MIBK), methyl ethyl ketone (MEK)	Estimated annual reductions of: ▪ 14 tonnes of methanol ▪ 70 tonnes of MEK ▪ 2 tonnes of MIBK ▪ 4 tonnes of toluene ▪ 28 tonnes of xylene ▪ 25 tonnes of VOCs	• Air
Elimination of Low Level PCB Liquid Waste (Ford, p. 44)	PCBs in light oil	▪ ~49,600 L of light oil containing less than 100 ppm PCB treated ▪ 480 L of oil containing 330 ppm PCBs treated ▪ 5,600 L of oil from transformers containing 110 ppm PCB treated	• Land, Air, Water (hazardous waste)
Recycle of Mercury Found in Obsolete Electrical Equipment (GM, p. 46)	Mercury and associated electrical equipment	▪ 0.27 tonnes of mercury recycled	• Air • Water • Land
Washable Spray Booth Robot/Automation Covers (Chrysler, p. 48)	Methyl ethyl ketone (MEK), methyl isobutyl ketone, toluene, xylene, VOCs	▪ Elimination of 18.1 tones per year of solvent emissions ▪ Reduced booth cleaning time ▪ Reduced downtime for maintenance repairs ▪ Conservation of resources	• Air • Land
Paint Shop Replacement (Ford, p. 50)	VOCs including toluene	▪ More than 400 tonnes per year VOC reduced ▪ Less paint sludge generated ▪ Less paint used ▪ Improved paint finish quality	• Air • Waste

TABLE 6. SUMMARY OF SELECTED NEW POLLUTION PREVENTION CASE STUDIES

Remediation of Reservoir & Pond and Recycle/Reuse of Solids (GM, p. 52)	Zinc, lead, copper and arsenic	▪ In total, 72,242 tonnes of solids containing the metals were excavated ▪ 37.7 tonnes of zinc removed ▪ 7.4 tonnes of lead removed ▪ 0.8 tonnes of copper removed ▪ 0.08 tonnes of arsenic removed	• Water • Sediment
Elimination of Paradichlorobenzene Deodorizer Blocks (Chrysler, p. 54)	1,4-dichlorobenzene (or paradichlorobenzene)	▪ 74 kg of paradichlorobenzene eliminated from release ▪ Better hygiene and reduction in maintenance requirements	• Air • Water
Colour Coat Automation (Ford, p. 56)	Paint & purge solvent including toluene and ethyl benzene	▪ 45,000 litres of each paint and purge solvent was not used ▪ Cost savings of $850,000 per year ▪ 65,000 litres of VOC reduced	• Air • Waste
Decrease in CVMA P2 Project Metals used in V8 Pistons (GM, p. 58)	Copper, Zinc and Chromium	▪ 41% overall reduction in metal compounds used in casting operations ▪ Increased quality and lower cost ▪ Reduced quantity of metals in chips for recycling and in metal sludge for landfill disposal ▪ 70.78 tonnes of copper reduced ▪ 12.66 tonnes of lead reduced ▪ 2.05 tonnes of chromium reduced	• Land
Reduction of Dross from Cylinder Head Pouring Tables (Ford, p. 63)	Aluminum dross	▪ Elimination of 38.9 tonnes of aluminum dross ▪ Cost and energy savings realized since less dross remelted for re-use	• Waste reduction

TABLE 6. SUMMARY OF SELECTED NEW POLLUTION PREVENTION CASE STUDIES

Removal of Isocyanate Foam Injection System (GM, p.65)	Methylenebis(phenylisocyanate)	▪ Increased plant health and safety ▪ Reduced potential for a spill ▪ 76.8 tonnes of methylenebis(phenylisocyanate) reduced from use ▪ ~6 tonnes of non-hazardous waste reduced	• Air • Liquid Waste • Solid Waste
Waste Treatment Plant Sludge Dryer (Chrysler, p. 68)	Industrial waste treatment plant paint sludge containing zinc, nickel and lead	▪ 2,500 tonnes of hazardous waste diverted from landfill as recycled	• Land
Toluene-Free Marking Ink Introduction (Ford, p. 70)	Toluene	▪ Existing supplier provided Toluene-free marking inks ▪ 1.21 tonnes per year toluene eliminated from use	• Air
Elimination of Lead Soldering of Fuel Tank Fill Pipes (GM, p. 72)	Lead and antimony	▪ 3.6 tonnes of lead eliminated from use ▪ 0.025 tonnes of antimony eliminated from use	• Air • Water • Land
Achieving a PCB-Free Facility (Chrysler, p. 74)	PCBs in electrical fixtures & equipment	▪ 45 tonnes of PCB waste removed and destroyed ▪ Elimination of risk associated with storage of PCBs	• Land • Air
Elimination of Isopropyl Alcohol in Mould Release Agents (Ford, p. 76)	Isopropyl alcohol (IPA)	▪ IPA eliminated from use in conjunction with phase-out of engine product ▪ 31.3 tonnes of IPA eliminated	• Air
Reduction in Use of Lead on Vehicles (GM, p. 78)	Lead in E-coat paint material	▪ ~ 4 tonnes per year of lead reduced ▪ Cost savings	• Air • Land

TABLE 6. SUMMARY OF SELECTED NEW POLLUTION PREVENTION CASE STUDIES

Powder Antichip Primer Paint Recycling (Chrysler, p. 81)	Scrap non-hazardous antichip paint powder	▪ 100% recycling of antichip powder ▪ 70 tonnes per year of powder diverted from landfill and resulting cost savings	• Land
Waste Water Treatment Facility Upgrade (Ford, p. 83)	Chromium, zinc, chlorine	▪ Increased reliability of treatment process ▪ Improvement in quality of discharged wastewater ▪ 44 kg per year chromium reduced from discharge ▪ Use of chlorine eliminated from wastewater treatment; 1.4 tonnes of liquid chlorine avoided 380 kg per year zinc reduced from discharge	• Surface water
Remediation of Spent Sand Area and Recycle of Solids (GM, p. 85)	Zinc, lead, copper, arsenic	▪ 185,280 tonnes of solids containing metals excavated ▪ 105,517 tonnes were recycled in cement manufacturing ▪ 44.2 tonnes of zinc removed and recycled or reused ▪ 12.2 tonnes of lead removed and recycled or reused ▪ 3.0 tonnes of copper removed and recycled or reused ▪ 0.77 tonnes of arsenic removed and recycled or reused	• Water • Land
Aluminum Die Casting Machine Modifications (Chrysler, p. 87)	Beryllium	▪ No machining of beryllium tips and no employee exposure to machining by-products ▪ Savings on tips and minimized use of beryllium ▪ 275 kg of beryllium per year reduced	• Land disposal

TABLE 6. SUMMARY OF SELECTED NEW POLLUTION PREVENTION CASE STUDIES

Plastics Waste Recycling (Ford, p. 89)	Polystyrene, polyvinyl chloride (PVC), fibre-glass reinforced plastic (FRP), low density polyethylene (LDPE)	▪ 76% of plant's total waste recycled; amounts of plastics recycled by type include: – 50 tonnes/year polystyrene – 80 tonnes/year PVC – 200 tonnes/year FRP – 5 tonnes/year LDPE	• Land (solid waste)
Reduction in Use of Paint Purge (GM, p. 92)	Paint purge containing acetone, xylene, toluene, methyl isobutyl ketone (MIBK)	▪ 200 tonnes per year VOC reduction ▪ Purge solvent usage reduced by over 1 litre/vehicle in 1996	• Air • Land
Phase Separation Technique utilized in Paint Pit Clean-Outs (Navistar, p. 95)	Hazardous liquid waste	▪ All waste is reclassified as non-hazardous ▪ Current, simple technology used ▪ Waste processing time reduced ▪ Cost savings of over $250,000 per year ▪ Duplication of program at other facilities	• Air • Land

V. SUPPLIER OUTREACH

The automotive companies as part of the MOU are committed to promoting pollution prevention activities and technology transfer to the supplier community. Individually, participating CVMA member companies have also shared information about the Project and its progress with their respective suppliers who are encouraged to undertake pollution prevention activities within their own facilities.

A one day pollution prevention technology transfer workshop was held for automotive suppliers on November 1997 in Toronto. The 1997 CVMA P2 Project Supplier Workshop had over 178 participants from small to large sized companies who provided services to the companies ranging from parts and chemical suppliers to waste handling companies. The pollution prevention experiences were shared through case study presentations by Chrysler, Ford and General Motors. In addition, the future directions and expectations of suppliers were presented by each CVMA member company. Topics covered included Ford Environmental System - ISO 14000; GM's PICOS system, and Chrysler's Life Cycle Management program. An overview was also given on the respective federal and provincial governments initiatives and programs.

The commitment of the companies to the CVMA pollution prevention project was underscored by the keynote address by Ms. Bobbie A. Gaunt, President and Chief Executive Officer, Ford Motor Company of Canada, Limited. Ms. Gaunt's address was centred on the need to build relationships in business. Ms. Gaunt's participation clearly demonstrates the senior management commitment of the CVMA companies to this Project.

VI. ONGOING COMMUNICATIONS

As part of its communications plan, task force members have been proactive in sharing information on the Project and its progress by making presentations to a variety of groups and through various publications. This includes public interest groups, labour and other interested parties with the intent to discuss the progress of the project, foster ongoing dialogue of the project and to solicit input on the project.

The list of presentations is by no means comprehensive but is provided to demonstrate to the reader that the project and its results have been shared with a variety of different audiences. This includes but is not limited to the following:

- Organization for Economic Co-operation and Development (OECD), Non-Regulatory Initiatives, Washington, D.C., September 1996
- Ontario Mining Association, 1996
- Air and Waste Management Association - Ont. Section Workshop, April 1997

- Air and Waste Management Association 90th Annual Meeting, June 1997
- University of Toronto, Institute of Environmental Studies, Graduate Course on Pollution Prevention and Control Environmental Sciences, October 1997
- Chemical Strategies Partnership Workshop regarding Chemical Management, San Francisco, November 1997
- Ontario Environment and Energy Conference, November 1997
- Environmental Management Resource Centre for Business (EMRCB), 1996

In late 1996, the Task Force, with Environment Canada, MOE and other MOU Task Forces, initiated discussions with environmental groups and others on enhancing consultation via the formation of a public advisory committee and an annual multistakeholder workshop. Throughout 1997, a consultant, the governments and Task Force members, consulted with key environmental groups and 57 other interest groups on these proposals. None of the groups contacted were keen to explore the possibility of a public advisory group because of limited resources and a multitude of competing consultation opportunities. However, most groups wanted information on the MOUs to be provided on a continuing basis in an easily accessible format. A number of municipalities expressed interest in an annual consultation/information transfer workshop and two groups offered to coordinate such a workshop. The Task Force continues to consult and is developing an annual consultation workshop proposal.

Publications such as the “At the Source” newsletter by the Canadian Centre for Pollution Prevention, the “Green Horizons” supplement in the November 9, 1994 Globe and Mail and the Hazardous Materials Management Magazine have featured articles on the Project. More recently, the CIRAC newsletter featured an article on the CVMA P2 Project and a paper was published on the Project by the Air and Waste Management Association.

VII. CANADIAN – U.S. PROJECT COORDINATION

On September 24, 1991, a similar project was initiated in the United States. The U.S. Environmental Protection Agency (U.S.EPA) is working with the American Automobile Manufacturers Association (AAMA), Chrysler, Ford and General Motors through the State of Michigan Department of Environmental Quality. The auto industry participation in the project is being coordinated by the AAMA. In late-1992, the two projects coordinated their activities to make the pollution prevention project a truly bilateral effort. The two task forces have met biannually to coordinate their activities. The two project task forces met in Detroit in May 1997 and in Toronto in October 1997. The group agreed to continue to meet on a annual basis in 1998 to share information and examine methods of sharing information on the two projects with suppliers and other interested parties. The next meeting will be held in the Fall of 1998 in the U.S.

The U.S. Auto Project has been broadened in its scope and is now a national

program. The U.S. Auto Project, formerly called the Great Lakes Pollution Prevention Project, was established in September 1995. This Project now includes a Mission Statement and a set of Operating Guidelines for each of the auto companies. Greater flexibility is afforded to each of the companies to determine the best manner in which to implement pollution prevention consistent with their business plans and environmental programs.

The U.S. Auto Project Advisory Group (APAG), established in 1994, continues their role in representing stakeholder interests in the expanded U.S. Auto Project. Advisory group members represent organizations with expertise in pollution prevention, manufacturing and/or environmental policy and include a cross section of trade associations, public interest groups, foundations, higher education, technology centres and government. The U.S Auto Project will expand its focus to include not only Great Lakes Persistent Toxics (GLPTs), but other materials of concern (hazardous and non-hazardous). The CVMA Project has examined the possibility of establishing a similar Public Advisory Group in Canada. (See section on Ongoing Communications).

VII. FUTURE DIRECTIONS

There is continued commitment by Chrysler, Ford and General Motors to further pollution prevention activities within their own operations and with their suppliers. The MOU is currently under consideration for renewal for another two years and is expected to be renewed in the Fall of 1998. The draft MOU was posted on Environment Canada's Green Lane and the Ontario Environmental Bill of Rights for public comment in March 1998. Input from the public is part of the ongoing commitment to consult with interested parties on the MOU and its activities. The draft renewal conditions are as follows:

The purpose, responsibilities and goals of the MOU extension will remain, except for the following proposed modifications.

I. The task force will continue to report on the progress of the development and implementation of pollution prevention plans.

II. The task force will enhance the procedure for reporting and verifying the progress of facility pollution prevention plans.

III. Through its existing communications plan, the task force will continue to report on progress to the public and interested stakeholders. Meetings and site visits with respect to pollution prevention projects with interested parties will provide additional opportunities for discussion and communication and input.

IV. The task force will continue to focus its pollution prevention activities on automotive manufacturing facilities to reduce and/or eliminate the use,

generation and release of the agreed upon list of 65 substances. Substances listed in Appendix 2 of the Canada-Ontario Agreement and Schedule 1 of the Canadian Environmental Protection Act (CEPA) as at January 1995 will be inventoried and those identified will be incorporated into the pollution prevention efforts. The use of CEPA Priority Substances List 1 (PSL1) Toxics, where CAS numbers are provided, will also be inventoried.

V. The task force will contribute to the Accelerated Reduction and Elimination of Toxics Program (ARET) and the Ontario Pollution Prevention Pledge Program (P4) by submitting project progress reports so that pollution prevention projects under the MOU can be incorporated into the activities and reports of these programs.

VI. The task force will continue to use environmental management systems within their facilities and encourage their use as part of the supplier outreach and technology transfer program.

VII. The task force will enhance the supplier outreach and technology transfer programs through additional supplier workshops, case study reports and presentations at industry sector and supplier association meetings.

The proposed modifications are intended to elaborate on key activities of the task force for the expected renewal period.

The governments, CVMA and its companies are committed to pollution prevention, in the true sense, and will continue to report on progress.

Appendices

Appendix I:

Inventory Results from 1993, 1995 and 1997

Inventory Results from 1993, 1995 and 1997

	Substance	CAS #	List Name	93 Inventory	96 Inventory	97 Inventory
1	Dichlorobenzenes	N/A	65, COA	X	X	X
2	Ethylene dibromide	106-93-4	65			
3	Hexachlorobenzene	118-74-1	65, COA, PSL1 Toxic			
4	Hexachlorobutadiene	87-68-3	65			
5	Hexachloroethane	67-72-1	65	X		
6	Methyl chloride	74-87-3	65			
7	Methylene chloride (Dichloromethane)	75-09-2	65, PSL1 Toxic	X	X	X
8	Nonachlor	3734-49-4	65			
9	Octachlorostyrene	29082-74-4	65, COA			
10	Pentachlorobenzene	608-93-5	65			
11	PCBs	N/A	65, COA, CEPA Sch. 1	X	X	X
12	Tetrachlorobenzene	N/A	65			
13	Tetrachlorobenzodioxin	N/A	65, COA			
14	Tetrachlorobenzofuran	N/A	65, COA			
15	Tetrachloroethylene	127-18-4	65, PSL1 Toxic	X	X	X
16	Trichloroethylene	79-01-6	65, PSL1 Toxic	X	X	X
17	Trichlorophenols	N/A	65			
18	Benzene	71-43-2	65, PSL1 Toxic	X	X	X

	Substance	CAS #	List Name	93 Inventory	96 Inventory	97 Inventory
19	2,4-Dinitrotoluene	121-14-2	65	X		
20	Ethylbenzene	100-41-4	65	X	X	X
21	Isophorone	78-59-1	65			
22	Nitrobenzene	98-95-3	65	X		
23	Phenol	108-95-2	65	X	X	X
24	butylbenzyl phthalate	85-68-7	65	X	X	X
25	di-n-butyl phthalate	84-74-2	65	X	X	
26	diethyl hexyl phthalate	117-81-7	65, PSL1 Toxic	X	X	X
27	diethyl phthalate	84-66-22	65	X	X	
28	dimethyl phthalate	131-11-3	65		X	X
29	acenaphtalene	N/A	65			
30	acenaphthene	83-32-9	65			
31	anthracene	120-2-7	65, COA, PSL1 Toxic			
32	benzo(a)anthracene	56-55-3	65, COA			
33	benzo(a)pyrene	50-32-8	65, COA			
34	benzo(k)fluoranthene	207-08-9	65, COA			
35	chrysene	218-01-9	65, COA			
36	fluorene	86-73-7	65			
37	indeno(1,2,3)pyrene	193-73-7	65, COA			

	Substance	CAS #	List Name	93 Inventory	96 Inventory	97 Inventory
38	napthalene	91-20-3	65	X	X	X
39	phenanthrene	85-01-8	65, COA			
40	pyrene	129-00-0	65, COA			
41	Terphenyl	26140-60-3	65			
42	Toluene	108-88-3	65	X	X	X
43	Antimony	7440-36-0	65	X	X	X
44	Arsenic	7440-38-2	65, PSL1 Toxic	X	X	X
45	Beryllium	7440-41-7	65	X	X	X
46	Cadmium	7440-43-9	65, COA, PSL1 Toxic	X	X	X
47	Chromium	7440-47-3	65, PSL1 Toxic	X	X	X
48	Copper	7440-50-8	65	X	X	X
49	Lead	7439-92-1	65, COA, CEPA Sch. 1	X	X	X
50	Mercury	7439-97-6	65, COA, CEPA Sch. 1	X	X	X
51	Nickel	7440-02-0	65, PSL1 Toxic	X	X	X
52	Selenium	7882-49-2	65	X	X	X
53	Silver	7440-49-2	65	X	X	X
54	Zinc	7440-66-6	65	X	X	X
55	Aldrin	309-00-2	65, COA			
56	Chlordane	57-74-9	65, COA			

	Substance	CAS #	List Name	93 Inventory	96 Inventory	97 Inventory
57	DDD	72-54-8	65, COA			
58	DDE	72-55-9	65, COA			
59	DDT	50-29-3	65, COA			
60	Dieldrin	60-57-1	65, COA			
61	Heptachlor	76-44-8	65			
62	Lindane	58-89-9	65, COA			
63	Mirex	2385-85-5	65, COA, CEPA Sch. 1			
64	Oxychlordane	27304-13-8	65			
65	Toxaphene	8001-35-2	65, COA			
66	4,4' -methylenebis(chloraniline)	101-14-4	COA		X	
67	Pentachlorophenol	87-65-5	COA			
68	3,3'-dichlorobenzidine	91-94-1	COA, PSL1 Toxic			
69	benzo(b)fluoranthene	205-99-2	COA			
70	benzo(j)fluoranthene	205-82-3	COA			
71	benzo(g,h,i)perylene	191-24-2	COA			
72	benzo(e)pyrene	192-97-2	COA			
73	dibenzo(a,j)acridine	224-41-9	COA			
74	dibenzo(a,h)anthracene	53-70-3	COA			
75	7H-dibenzo(c,g)carbazole	194-59-2	COA			

	Substance	CAS #	List Name	93 Inventory	96 Inventory	97 Inventory
76	dibenzo(a,i)pyrene	189-55-9	COA			
77	dinitropyrene	N/A	COA			
78	fluoranthrene	206-44-0	COA			
79	perylene	198-55-0	COA			
80	Tributyl tin	688-73-3	COA			
81	Hexachlorocyclohexane	608-73-1	COA			
82	Asbestos	1332-21-4	CEPA Sch. 1			X
83	Dodecachloropentacyclo[5.3.0.02,6.03,9.04,8]deca	N/A	CEPA Sch. 1			
84	Polybrominated biphenyls	N/A	CEPA Sch. 1			
85	Polychlorinated terphenyls	N/A	CEPA Sch. 1			
86	Vinyl chloride	75-01-4	CEPA Sch. 1			
87	Bromochlorodifluoromethane	353-59-3	CEPA Sch. 1			X
88	Bromotrifluoromethane	75-63-8	CEPA Sch. 1			X
89	Dibromotetrafluoroethane	124-73-2	CEPA Sch. 1			
90	Fuel containing toxic substances	N/A	CEPA Sch. 1			
91	Dibenzo-para-dioxin	N/A	CEPA Sch. 1			
92	Dibenzofuran	N/A	CEPA Sch. 1			
93	Polychlorinated dibenzo-para-dioxins	N/A	CEPA Sch. 1			
94	Polychlorinated dibenzofurans	N/A	CEPA Sch. 1			

	Substance	CAS #	List Name	93 Inventory	96 Inventory	97 Inventory
96	1,1,1-trichloroethane (Methyl chloroform)	71-55-6	CEPA Sch. 1			
97	Bromofluorocarbons	N/A	CEPA Sch. 1			
98	Hydrobromofluorocarbons	N/A	CEPA Sch. 1			
99	Methyl bromide	74-83-9	CEPA Sch. 1			
100	Chlorofluorocarbons	N/A	CEPA Sch. 1.			
101	1,2-dichloroethane	107-06-02	PSL 1 Tox.			X
102	Benzidine	92-87-5	PSL 1 Tox.			
103	Bis(chloroethyl)ether	111-44-4	PSL 1 Tox.			
104	Bischloromethyl methyl ether	107-32-2	PSL 1 Tox.			
105	Chlorinated paraffins	N/A	PSL 1 Tox.			X
106	Chorinated wastewater effluents	N/A	PSL 1 Tox.			
107	Creosote impregnated wastes	N/A	PSL 1 Tox.			
108	Dioxins	N/A	PSL 1 Tox.			
109	Effluents from pulp and paper using bleach	N/A	PSL 1 Tox.			
110	Furans	N/A	PSL 1 Tox., COA			
111	Inorganic Fluorides	N/A	PSL 1 Tox.			X
112	PAHs(1)	N/A	PSL 1 Tox., COA			
113	Refractory Ceramic Fibres	N/A	PSL 1 Tox.			X

Note: (1) = PAHs are already targeted under the initial list of 65 and COA substances

Appendix II:

Selected Company Pollution Prevention Case Studies

CONVERSION TO WATERBORNE BASE COAT PAINTS

CHRYSLER CANADA LTD.

BRAMALEA ASSEMBLY PLANT

The Bramalea Assembly Plant in Brampton, Ontario manufactures 1,000 cars per day of the LH line - Chrysler Intrepid, Concorde, and LHS. The production processes include stamping, body welding, painting and assembly.

In September 1997 the plant launched an all new generation of LHs. The new vehicles were designed from the ground up with pollution prevention and Life Cycle Management as part of the design criteria.

The facility has extensive waste management programs, including waste drum labelling, weekly internal audits, on-site waste treatment facility, spill teams, and environmental training sessions all handled by an Environmental Coordinator. The recycle programs include scrap metals from the stamping facility, cardboard, wooden skids and blue box for paper and pop cans. The on-site industrial wastewater treatment facility handles all process wastes from the vehicle assembly plant and pretreats the water to the sewer use standards prior to discharge to the municipal sewer system.

Traditionally, the vehicles have been painted with a solvent based colour coat prior to spraying with a solvent borne clear coat. The solvents contain methyl isobutyl ketone (MIBK), toluene, xylene, methanol, and volatile organic compounds (VOCs) which are emitted to the atmosphere as the paint dries on the vehicle in the spray booths and ovens.

During the summer of 1997, the Bramalea Assembly Plant converted the colour base coat paints from high solids solvent borne enamels to waterborne paints. This conversion eliminated over 75% of the solvents normally associated with this process.

The switch for waterborne paints assists Chrysler Canada in meeting its commitment to reduce air emissions from paint shop operations as part of Ontario's Smog Plan and the Federal VOC/NO_x Reduction Plan.

Substance(s) Targeted:

Toluene, methanol, xylene, methyl isobutyl ketone (MIBK), methyl ethyl ketone (MEK) and VOCs.

Targeted Reduction(s):

75% of solvents used in base coat painting.

Results and Advantages:

Estimated annual reductions are:

- 14 tonnes of methanol
- 70 tonnes of MEK
- 2 tonnes of MIBK
- 4 tonnes of toluene
- 28 tonnes of xylene
- 25 tonnes of VOCs.

The water-based paints also result in a higher quality finish.

Objective:

To reduce emissions by switching to waterbased base coat paints

Project Description:

Conversion of paint spray operations to accept waterborne base coat paints

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Material modification, process change

Environmental Media:

Air

Capital Investment:

$57 million

Cost Savings:

Not available

Barriers Encountered:

None

ELIMINATION OF LOW LEVEL PCB LIQUID WASTE

FORD MOTOR COMPANY OF CANADA, LIMITED

WINDSOR CASTING PLANT

The Windsor Casting Plant (WCP) is Ontario's largest iron foundry, which produces automotive engine blocks, bearing caps and crankshafts. The approximately 950 employees, both salaried and hourly, operate on two eight hour production shifts. The plant began operations in 1934 and shares a site with the new Windsor Engine Plant. Environmental programs at this facility include particulate and odour reduction programs for air, phenol reduction and recirculation programs for water, non-production and sand recycling programs for solid residues. The facility is a major user of reclaimed metals as raw materials.

As part of the plant's continuous process improvement strategy, a program to treat liquid waste containing PCBs at the Windsor Powerhouse was initiated. The liquid waste was a light oil containing less than 100 ppm PCBs. A mobile chemical dechlorinating process was used to treat the PCBs to a concentration of less than 2 ppm. After treatment, the oil was sent to a licensed recycler for reuse.

Substance(s) Targeted:

PCBs (polychlorinated biphenyls) in light oil

Targeted Reduction(s):

100% of low level PCB liquid waste

Results and Advantages:

In 1996, a mobile dechlorinating process was used to treat:

approximately 49,600 L of light oil containing less than 100 ppm PCB,
480 L of oil containing 330 ppm PCBs, and
5,600 L of oil, from transformers, containing 110 ppm PCB.

The mobile chemical dechlorinating technology allowed for on-site treatment and reduced the PCB concentration to less than 2 ppm. All of the treated oil was sent to a licensed recycler for reuse.

Objective:

To destroy PCBs in oil on-site using a portable process and, therefore, eliminating the need for disposal of a hazardous liquid waste and yielding a recyclable product.

Project Description:

In 1996, at the WCP's Powerhouse, a program was established to batch treat light containing PCBs stored on-site. The PCB's in the waste oil were chemically destroyed using the Laidlaw Environmental Services Inc.'s "PPM Mobile Chemical Dechlorinating Process". This mobile process uses a sodium based reagent to chemically dechlorinate the PCBs. The process operates at ambient temperature and pressure, and the decontaminated oil is rendered suitable for recycling. The treated oil was ultimately sent to a licensed recycler for reuse.

Environmental Hierarchy:

Chemical Destruction

Pollution Prevention Approach:

Chemical elimination of contamination to allow material recovery.

Environmental Media Addressed:

Hazardous waste (Land, Air, Water)

Capital:

$120,000

Barriers Encountered:

Need for implementing an on-site solution.

RECYCLE OF MERCURY FOUND IN OBSOLETE ELECTRICAL EQUIPMENT

GENERAL MOTORS OF CANADA LIMITED

ST. CATHARINES GLENDALE AVENUE FACILITY

The St. Catharines Glendale Avenue facility is a 2 million plus square foot facility which produces V6 & V8 engines employing approximately 2,500 employees.

Glendale Avenue utilizes dust collectors and oil mist collectors to control air emissions. Process water is treated off-site at the Ontario Street facility. Sanitary effluent is treated on-site through an activated sludge secondary treatment plant. Glendale Avenue also has metal chip, dross, cardboard, fine paper, barrel and pallet collection and recycling programs as part of their solid waste management systems. To manage environmental issues, the plant has a spill response procedure, a "WeCare" program, weekly environmental audits, an asbestos management plan and a program to reduce CFCs and methyl chloroforms (MCFs).

The plant targeted the removal of mercury from obsolete and out-of-service equipment at the Glendale Avenue Facility to prevent the possibility of future spills or leaks. The obsolete electrical equipment throughout the facility was collected and consolidated in secure storage areas. An environmental services company was contracted to collect the mercury and recycle the equipment. A total of 270 kg of mercury (primarily from switches) was collected and shipped to a mercury recycling facility in the United States.

Substance(s) Targeted:

Mercury and associated electrical equipment

Targeted Reductions:

100% removal & recycle of mercury in obsolete electrical equipment

Results and Advantages:

0.27 tonnes (270 kg) of mercury was shipped to a recycling facility.

Objective:

To remove mercury from obsolete and out-of-service equipment at the Glendale Avenue Facility to prevent the possibility of future spills or leaks.

Project Description:

Obsolete electrical equipment throughout the facility was collected and consolidated in secure storage areas. An environmental services company was contracted to collect and recycle the equipment. 270 kg of mercury was shipped to a primary recycling facility in the United States.

Environmental Hierarchy:

Recycling

Pollution Prevention Approach:

Recycle

Environmental Media Addressed:

Air, water and land

Capital Investment:

Nil

Barriers Encountered:

Finding an appropriate recycling company for mercury, there were no available facilities in Canada.

WASHABLE SPRAY BOOTH ROBOT/AUTOMATION COVERS

CHRYSLER CANADA LTD.

BRAMALEA ASSEMBLY PLANT

The Bramalea Assembly Plant in Brampton, Ontario manufacturers 1,000 cars per day of the LH line - Chrysler Intrepid, Concorde, and LHS. The production processes include stamping, body welding, painting and assembly.

In September 1997 the plant is launching an all new generation of LHs. The new vehicles were designed from the ground up with pollution prevention and Life Cycle Management as part of the design criteria.

The facility has extensive waste management programs, including waste drum labelling, weekly internal audits, on-site waste treatment facility, spill teams, and environmental training sessions all handled by an Environmental Coordinator. The recycle programs include scrap metals from the stamping facility, cardboard, wooden skids and blue box for paper and pop cans. The on-site industrial wastewater treatment facility handles all process wastes from the vehicle assembly plant and pretreats the water to the sewer use standards prior to discharge to the municipal sewer system.

The automatic spray painting equipment and robots in the paint booths accumulate paint overspray during the painting operations. To keep them clean, manual washing with booth cleaning solvents is required daily.

By covering the robots and spray equipment with washable robot covers and removing them periodically for cleaning, it reduces the need for booth cleaning solvents. These solvents flash off and end up as air emissions. Also, by using washable covers instead of disposable ones, it avoids creation of solid wastes.

The changeover saves 23,000 litres of solvent per year and reduces emissions by over 18 tonnes per year.

Substance(s) Targeted:

Methyl ethyl ketone (MEK), methyl isobutyl ketone (MIBK), toluene, xylene, VOCs.

Targeted Reduction(s):

100% elimination of solvent usage for robot cleaning.

Results and Advantages:

Elimination of 23,000 litres of solvent and 18.1 tonnes per year of solvent emissions.

- Reduces booth cleaning time.
- Reduces downtime for maintenance repairs, since the equipment does not need to be cleaned first.
- Conserves resources through reduced solvent usage.

Objective:

To eliminate robot cleaning and use of cleaning solvents

Project Description:

To cover spray booth robots with washable covers to eliminate annual solvent cleaning

Environmental Hierarchy:

Pollution Prevention, Recycling Process Modification

Environmental Media:

Air, land

Capital Investment:

Not available

Cost Savings:

Nil - the solvent and manpower savings offset by cost of covers.

Barriers Encountered:

None

PAINT SHOP REPLACEMENT

FORD MOTOR COMPANY OF CANADA, LIMITED

ONTARIO TRUCK PLANT

The Ontario Truck Plant (OTP), which began operations in 1965, manufactures the F-Series pick-up for the North American market. The plant is located in Oakville, Ontario, on the same property as the headquarters of Ford of Canada and the Oakville Assembly Plant. The truck plant has 2.9 million square feet of floor area and employs approximately 1300 people. Ford F150 and F250 pick-ups are assembled at 52 units per hour on one shift for a nominal capacity of 520 units per day.

The OTP was the subject of approximately $1 billion in upgrades and expansion for the production of the new F-Series pickup including a new $400 million paint shop. Opened in 1996, the new paint shop uses high solids (lower solvent content) paints that are applied with state-of-the-art automation. The application efficiency is improved by using electrostatic deposition in conjunction with automation that includes robots, mini bells and reciprocators. This automation also includes systems for purge solvent recovery. A higher percentage of paint sprayed reaches the vehicle, therefore, less is needed. This means lower emissions and less paint sludge waste. In addition to these improvements, thermal oxidation units are used to destroy the solvent emissions (VOCs) from the paint ovens. Thermal oxidation reduces emissions by approximately 20%.

These improvements taken together represent a reduction of approximately 60% in solvent emissions per vehicle from painting compared to those in the 1970's. This reduction represents an estimated avoidance of solvent emissions in excess of 400 tonnes per year at the current production volumes. It is not possible to estimate VOC makeup accurately on an ongoing basis because it is different for each paint colour. The number of units of any given colour changes in response to customer orders.

Substance(s) Targeted:

VOCs including toluene

Targeted Reduction(s):

Minimize solvent emissions from painting to the extent practical using high solids paint, purge recovery, automation and oven emission controls.

Results and Advantages:

Greater than 400 tonnes per year VOC reduction, less paint sludge, lower paint consumption and improved paint finish quality.

Objective:

To implement a system to improve paint finish quality while reducing emissions.

Project Description:

Paint shop replacement to allow high solids paint to be applied in a more automated efficient fashion, including thermal destruction for paint oven emissions.

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Process change - New state-of-the-art painting facility using high solids paint

Environmental Media Addressed:

Air and waste

Capital Investment:

Approximately $400 million

Barriers Encountered:

Siting and environmental approvals

REMEDIATION OF RESERVOIR AND POND AND RECYCLE/REUSE OF SOLIDS

GENERAL MOTORS OF CANADA LIMITED

ST. CATHARINES GLENDALE AVENUE FACILITY

The St. Catharines Glendale Avenue facility is a 2 million plus square foot facility which produces V6 & V8 engines employing approximately 2,500 employees.

Glendale Avenue utilizes dust collectors and oil mist collectors to control air emissions. Process water is treated off-site at the Ontario Street facility. Sanitary effluent is treated on-site through an activated sludge secondary treatment plant. Glendale Avenue also has metal chip, dross, cardboard, fine paper, barrel and pallet collection and recycling programs as part of their solid waste management systems. To manage environmental issues, the plant has a spill response procedure, a "WeCare" program, weekly environmental audits, an asbestos management plan and a program to reduce CFCs and methyl chloroforms (MCFs).

The Glendale Avenue staff continued the program in 1996 and 1997 to remediate a reservoir and spill containment pond. The reservoir and pond were polishing components of the former Glendale Avenue foundry's wastewater treatment system. After the wastewater treatment plant was decommissioned, General Motors of Canada Limited's environmental officers decided to remediate the soils in the containment pond which had accumulated metals during the service life of the waste water treatment plant. The reservoir and pond were temporarily isolated and taken out of service to allow excavation of soils. The solids were recycled as feedstock in a cement manufacturing or reused as construction material or capping material in an offsite municipal landfill. The project, which was completed in 1997, was undertaken as part of the company's environmental stewardship program and to prevent the potential future contamination of sediment and surface water.

Substance(s) Targeted:

Zinc, Lead, Copper & Arsenic

Targeted Reductions:

100% removal & recycling/reuse of solids from the reservoir and pond of the former Glendale Ave. foundry's wastewater treatment system.

Results and Advantages:

72,242 tonnes of solids containing zinc, lead, copper and arsenic were excavated. 8,100 tonnes was recycled as feedstock and 64,142 tonnes was reused. This resulted in approximately 37.7 tonnes of zinc, 7.4 tonnes of lead, 0.8 tonnes (800 kg) of copper and 0.08 tonnes (80 kg) of arsenic being removed from the reservoir and pond.

Objective:

To remove & recycle/reuse solids containing metals from the site to prevent potential future contamination of sediment and surface water.

Project Description:

The Glendale Avenue staff continued the program in 1996 to remediate a reservoir and spill containment pond. The reservoir and pond were polishing components of the former Glendale Avenue foundry's wastewater treatment system. After the wastewater treatment plant was decommissioned, it was decided to remediate the soils in the containment pond which had accumulated metals during the service life of the waste water treatment plant. The metals originated primarily from the dust collectors. The reason for the remediation was good stewardship.

The reservoir and pond were temporarily isolated and taken out of service to allow excavation of solids. The solids were recycled as a feedstock in cement manufacturing or reused as construction material or capping material in an offsite municipal landfill.

Environmental Hierarchy:

Reuse/Recycle and Remediation

Pollution Prevention Approach:

Recycle & reuse

Environmental Media Addressed:

Sediment & water

Capital Investment:

Part of a multi-million dollar remediation project

Barriers Encountered:

Development and acceptance of recycle market

ELIMINATION OF PARADICHLOROBENZENE DEODORIZER BLOCKS

CHRYSLER CANADA LTD.

PILLETTE ROAD TRUCK ASSEMBLY PLANT

The Pillette Road Truck Assembly Plant in Windsor, Ontario manufacturers 425 full size Dodge Ram Vans and Wagons per day. The assembly plant employs 1,900 people on a two shift basis in a 750,000 square feet facility which welds, paints and assembles the vehicles.

The facility is a waste reduction leader. It has won the Essex County Waste Management Award of Merit three years in a row for waste diversion. The recycle practices include cardboard, pallets, scrap wood, plastics, find paper, styrofoam, pop cans, cooking fat, empty drums, xylene solvent and waste oil. Last year the plant diverted over 7,600 tonnes from the landfills.

The traditional way of deodorizing men's washrooms is with the use of a sanitary paradichlorobenzene (1,4-dichlorobenzene) blocks commonly known as para pucks. The substance 1,4-dichlorobenzene appears not only on the CVMA P2 Project list, but is also on the Federal Government's Accelerated Reduction/Elimination of Toxics (ARET) initiative.

Chrysler has committed to eliminate the use of 1,4-dichlorobenzene through all the facilities by the year 2000 and expect to meet the commitment by the end of 1997. Pillette Road Truck Assembly Plant eliminated the use of paradichlorobenzene by installing continuous feed deodorizers provided by Rentokil who maintains the devices. The total annual usage for the plant was 870 blocks or 0.074 tonnes (74 kilograms). The total usage for all of Chrysler's manufacturing facilities was 0.36 tonnes or 360 kilograms per year.

Substance(s) Targeted:

1,4-dichlorobenzene (or paradichlorobenzene)

Targeted Reduction(s):

100% in plant and 100% in all facilities by the end of 1997

Results and Advantages:

Elimination of the release of 0.074 tonnes (74 kilograms) of a persistent toxic substance for the plant and 360 kilograms for all manufacturing facilities

Other advantages include better hygiene and reduction in maintenance caused by the para pucks plugging drain lines.

Objective:

To eliminate the use of paradichlorobenzene blocks (1,4-dichlorobenzene) blocks

Project Description:

Replace the use of para-blocks with continuous feed deodorizers in men's washrooms

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Product substitution, process modification

Environmental Media:

Air, water

Capital Investment:
None - Service contract

Cost Savings:
Not available

Barriers Encountered:
None

COLOUR COAT AUTOMATION

FORD MOTOR COMPANY OF CANADA, LIMITED

OAKVILLE ASSEMBLY PLANT

The Oakville Assembly Plant (OAP) manufacturers the Windstar minivan for the global market. The plant is located on a 487 acre site on the same property as the headquarters of Ford Canada and the Ontario Truck Plant. The facility has 3.5 million square feet of floor area and employs approximately 3500 people. Windstars are assembled at 75 units per hour on two shifts for a nominal capacity of 1200 units per day. Production began at the facility in 1953.

The Oakville Assembly Plant was the subject of approximately $1 billion in upgrades and expansion to produce the Windstar including a new $439 million paint shop. The new paint shop which opened in 1992 uses high solids (lower solvent content) paints which are applied with state-of-the-art automation. The application efficiency is improved by using electrostatic deposition in conjunction with automation which includes robots, mini bells and reciprocators. The Automation also includes systems for purge solvent recovery. A higher percentage of paint sprayed reaches the vehicle, therefore, less is needed. This means lower emissions and less paint sludge waste. In addition to these improvements thermal oxidation units are used to destroy solvent emissions (VOC's) from the paint ovens. Thermal oxidation reduces emissions approximately 20%.

This project involved relocating colour tree assemblies on the four overhead reciprocators in the two main colour spray booths. The colour trees were moved from a location 25 feet away from the reciprocators to a location directly on the reciprocators. This change reduced the waste paint and purge solvent associated with lining cleaning during colour changes. There was no previous experience with this type of arrangement.

Substance(s) Targeted:

Paint and purge solvent including toluene and ethyl benzene

Targeted Reduction(s):

75% reduction in paint and purge solvent waste from colour change at reciprocators

Results and Advantages:

Savings of over 45,000 litres (12,000 usg) each of paint and purge solvent at costing savings of approximately $850,000 per annum. Reduction of approximately 65,000 litres (18,000 usg) of VOC. The amount of toluene and ethyl benzene cannot be accurately estimated on an ongoing basis because solvent packages differ by colour and the mix of colour applied is dynamic.

Objective:

To eliminate waste paint and purge solvent associated with colour changes at reciprocators.

Project Description:

Relocation of colour tree assemblies on reciprocators in colour paint booths.

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Equipment modification, use reduction

Environmental Media Addressed:

Air, waste

Capital Investment:

$440,000

Barriers Encountered:

None

DECREASE IN CVMA P2 PROJECT METALS USED IN V8 PISTONS

GENERAL MOTORS OF CANADA LIMITED

ST. CATHARINES ENGINE PLANT

The St. Catharines Glendale Avenue facility is a 2 million plus square foot facility which produces V6 & V8 engines employing approximately 2,500 employees.

Glendale Avenue utilizes dust collectors and oil mist collectors to control air emissions. Process water is treated off-site at the Ontario Street facility. Sanitary effluent is treated on-site through an activated sludge secondary treatment plant. Glendale Avenue also has metal chip, dross, cardboard, fine paper, barrel and pallet collection and recycling programs as part of their solid waste management systems. To manage environmental issues, the plant has a spill response procedure, a "WeCare" program, weekly environmental audits, an asbestos management plan and a program to reduce CFCs and methyl chloroforms (MCFs).

A better quality and lower cost piston was sought out by the plant. The V8 aluminum piston was redesigned using a new aluminum alloy to achieve a higher quality, lighter piston, with a longer life. As a result of this redesign, lower tool maintenance costs and lower scrap rates were achieved.

Substance(s) Targeted:

CVMA P2 Project metals such as copper, zinc, and chromium

Targeted Reductions:

A significant reduction in CVMA P2 Project metals used in the casting of aluminum V8 pistons.

Results and Advantages:

A 41% overall reduction in CVMA P2 metal compounds used in the casting of aluminum V8 pistons with increased quality and lower cost. A reduced quantity of copper, zinc and chromium transferred in chips for recycling and in metal sludge for disposal to landfill.

Compound	Decrease of CVMA P2 Metal in tonnes	Increase of CVMA P2 Metal in tonnes
Copper	70.783	
Nickel		27.034
Zinc	12.662	
Lead		0.343
Chromium	2.053	

Total reduction of CVMA P2 Project metals used in the casting of V8 aluminum pistons is 58.121 tonnes.

Objective:

To develop a better quality, lower cost piston

Project Description:

Redesign the V8 aluminum piston using a new aluminum alloy to achieve a higher quality, lighter piston, with longer life, lower tool maintenance cost and lower scrap rate.

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Product redesign to improve the quality and reduce the cost of pistons while reducing the amount of CVMA P2 Project metals.

Environmental Media Addressed:

Land

Capital Investment:

Nil

Barriers Encountered:

None

SOLVENT MANAGEMENT PROGRAM

CHRYSLER CANADA LTD.

WINDSOR ASSEMBLY PLANT

The Windsor Assembly Plant in Windsor, Ontario, manufactures 1,450 minivans per day - Dodge Caravans and Plymouth Voyagers. The assembly plant employs 5,700 people on a three shift basis, in a 3.5 million square feet facility which welds, paints and assembles the popular minivans.

A solvent management program was implemented at Windsor Assembly Plant with the following objectives:

- Continuous Quality Improvement through reduction, elimination, and substitution
- Cost reduction
- Reduction and elimination of VOCs in paint shop solvents
- Technology advancement

The Solvent Management Program at Windsor Assembly Plant involves having a single source, single tier supplier to supply all solvents required for the paint shop. The products which are covered under this program include: purge solvents, paint cleaning materials, booth/floor/equipment/oven cleaners, grate cleaners and coatings, and sealer wiping solvents.

The Solvent Management Program was kicked off at Windsor Assembly in June of 1995. The plant contracted PPG/Chemfil as its Solvent Manager and a dedicated representative was assigned full time to the plant. The Solvent Manager is responsible for the following items:

- Provide monthly reports on usages, trends and purge rates
- Record weekly inventories of all products
- Investigate elimination or substitution opportunities
- Conduct purge audits and collection equipment efficiencies
- Audit maintenance cleaning practices
- Train operators on proper material handling and operating practices
- Spearhead the Solvent Management Team and maintain a formal Business Plan with the Team’s goals and objectives toward pollution prevention

The original target for VOC reductions since the start of this program was 20%; however, in 1996 a reduction of 46% in VOCs was realized with a 41% reduction in solvent costs. These results and advantages were achieved through the following initiatives:

- Introduction of water based products due to the changeover of the plant from solvent borne to waterborne paint technology

- Decrease the frequency of purging with the solvent based purge
- Decrease the use of purge solvent for cleaning purposes
- Encourage less use of the solvent based booth cleaner through operator training and cleaning practices
- Support less use of naphtha solvent as a body wipe and more dry wiping of the vehicle body in preparation of topcoat applications
- Expand the use of robot covers in the booths in order to decrease usage of cleaning solvents

Substance(s) Targeted:

Toluene, xylene, methyl isobutyl ketone (MIBK), methyl ethyl ketone (MEK) and of targeted substances as reported in the VOCs.

Targeted Reduction(s):

20%

Results and Advantages:

Total releases to air decreased by 430 tonnes of xylene, toluene, MIBK and VOCs. Better control of solvent usage has resulted and a systematic approach for VOC reductions has been developed for future programs.

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Material and resource conservation, process modification

Environmental Media:

Air

Capital Investment:

None

Cost Savings:

41% reduction in solvent costs or $450,000 per year

Barriers Encountered:

None

REDUCTION OF DROSS FROM CYLINDER HEAD POURING TABLES
FORD MOTOR COMPANY OF CANADA, LIMITED
ESSEX ALUMINUM PLANT

The Essex Aluminum Plant manufactures aluminum cylinder heads, pistons and intake manifolds by semi-permanent, permanent and evaporative casting processes, respectively. The facility produces approximately 70,000 castings per day using half a million pounds of aluminum. There are approximately 575 employees, both salaried and hourly, operating on three eight hour shifts, seven days per week. Environmental programs at this facility included acid gas and odour reduction programs for air and sand recycling programs for solid residues. The facility is a major user of recycled aluminum with approximately 94% of the more than 13 million pounds of molten metal poured in a month being recycled material.

As part of the waste minimization/recycling program, aluminum dross from the cylinder head pouring process was targeted. A project team including members of management, foremen and hourly personnel studied options for reducing dross generated by the pouring process. The aluminum dross was generated on the cylinder head cast turntables. Each turntable was equipped with 5 molds with individual pouring ladles. These ladles air cooled between pours.

The resulting solution involved replacing the individual ladles on each mold with a pouring robot to serve the five molds on the turntable. The single ladle has negligible cooling and resulted in a dross reduction of 45 kilograms per turntable for each shift.

Substance(s) Targeted:

Aluminum dross

Targeted Reduction(s):

90% reduction

Results and Advantages:

An estimated 45 kilograms of aluminum dross per turntable per shift was eliminated at the plant. For six turntables operating 3 shifts per day and six days per week results in an elimination of 38.9 tonnes of dross. Also, cost and energy savings have been realized since less dross must be remelted for re-use.

Objective:

To reduce aluminum dross generation.

Project Description:

Elimination of dross generation process by process change and machine modifications.

Environmental Hierarchy:

Pollution Prevention, Waste Minimization

Pollution Prevention Approach:

Process and equipment change, waste minimization

Environmental Media Addressed:

Waste reduction (material already recycled)

Capital Investment:

$2.1 million

Barriers Encountered:

None

REMOVAL OF ISOCYANATE FOAM INJECTION SYSTEM

GENERAL MOTORS OF CANADA LIMITED

OSHAWA CAR PLANT

The Oshawa Autoplex is the largest North American Automotive facility, occupying a total of 12,216 thousand square feet of floor area. The Car Assembly plants were converted in early 1994 to assemble the Chevrolet Lumina, the Buick Regal Custom coupes and sedans, the Regal Limited sedans and the Regal Gran Sport coupes and sedans. In total, the two Car Assembly plants employ approximately 7,900 people.

A comprehensive waste management system at the facility is comprised of many components including the following:

Waste Water:
All process water from the facility flows to an on-site treatment plant. The plant treats approximately 1.4 million imperial gallons per day in a semi-continuous process that removes large solid material, floating insoluble organic, suspended solid, phosphorous, and heavy metals.

Hazardous Waste:
Drummed hazardous waste such as sealers and spent solvents are labeled at source and are sent to one of four drum marshaling areas within the Autoplex. These drums are then prepared for shipment and are picked up for disposal.

Hazardous bulk solids such as Waste Water Treatment Sludge and Energy From Waste fly ash are bulked in the Hazardous Waste bunkers and are transported to secure landfill for disposal.

Purge solvents for the paint shops in the Car and the Truck Plants are collected in bulk, recycled, and returned for re-use.

Recycling:
Each plant has very successful programs in place for the collection of cardboard, plastics, office paper, newspaper, and pop cans for recycling.

Waste Sorting Facility:
The on-site waste sorting facility receives mixed waste compactor boxes from the plant and sorts the material to maximize the recycling stream volume, to ensure Autoplex waste complies with all landfill bans, and to provide a clean stream of combustible material for the on-site Energy From Waste Facility.

At the Oshawa Car Plant isocyanate based foam was used as a sound-deadener component. The foam was injected into different structural areas of the vehicle. The plant undertook to completely remove the use of isocyanate foam in this process. The unreacted isocyanate foam is considered to be of significant concern from an environmental and human health perspective. A vehicle design change which included noise and vibrational analysis was implemented which allowed the use of metal baffles instead of the isocyanate foam. The existing foam system was drained, cleaned, disassembled and safely disposed.

Substance(s) Targeted:

Methylenebis(phenylisocyanate)

Targeted Reduction(s):

100% reduction of Methylenebis(phenylisocyanate) from foam injection process

Results and Advantages:

Increased plant health and safety, reduction in potential for a spill, decreased use of methylenebis(phenylisocyanate) by 76.8 tonnes at the car plant, decrease of nearly 6 tonnes of hazardous waste generated at the car plant from the foam injection system

Objective:

To completely remove use of isocyanate foam as a sound deadener.

Project Description:

Isocyanate based foam has been used in vehicles as a sound-deadener component. The foam was injected into different structural areas of the vehicle. Unreacted isocyanate foam is considered environmentally significant and a concern for human health. Replacing the isocyanate foam system with metal baffles eliminated these concerns. The existing foam system had to be drained, cleaned, and disassembled.

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Process elimination

Environmental Media Addressed

Air, liquid waste, and solid waste

Capital Investment:

Not available

Barriers Encountered:

None

WASTE TREATMENT PLANT SLUDGE DRYER

CHRYSLER CANADA

BRAMALEA ASSEMBLY PLANT

The Bramalea Assembly Plant in Brampton, Ontario manufacturers 1,000 cars per day of the LH line - Chrysler Intrepid, Concorde and LHS. The production processes include stamping, body welding, painting and assembly.

In September 1997 the plant launched an all new generation of LHs. The new vehicles are designed from the ground up with pollution prevention and Life Cycle Management as part of the design criteria.

The facility has extensive waste management programs, including waste drum labelling, weekly internal audits, on-site waste treatment facility, spill teams, and environmental training sessions all handled by an Environmental Coordinator. The recycle programs include scrap metals from the stamping facility, cardboard, wooden skids and blue box for paper and pop cans. The on-site industrial wastewater treatment facility handles all process wastes from the vehicle assembly plant and pretreats the water to the sewer use standards prior to discharge to the municipal sewer system.

The wet sludge from the waste treatment plant, consisting mainly of paint solids, is a “listed” hazardous waste in Ontario and is shipped to a hazardous landfill in Ontario at an annual rate of 2,500 tonnes.

The installation of a sludge dryer in 1997, allows the sludge to be processed into dry pellets which are bagged and ready for recycling. They can be recycled into asphalt, automotive sealers, or as supplemental fuel for cement kilns. However, before it can be recycled, it must go through an environmental approval process in Ontario to be delisted as a hazardous waste.

Substance(s) Targeted:

Industrial Waste Treatment Plant Paint Sludge containing zinc, nickel and lead

Target Reduction(s):

100% elimination of plant sludge as a waste.

Results and Advantages:

Recycling 100% of the waste treatment plant sludge would avoid landfilling 2,500 tonnes of hazardous waste

Objective:

To eliminate generation and disposal of Waste Treatment Plant sludge

Project Description:

Installation of a sludge dryer to make recyclable dry pellets for reuse in asphalt paving

Environmental Hierarchy:

Treatment

Pollution Prevention Approach:

Process modification, recycling

Environmental Media Addressed:

Land

Capital Investment:

$700,000

Cost Savings:

$150,000 per year

Barriers Encountered:

Delisting of the dry pellets as hazardous waste may be a barrier even when it meets the leachate criteria for non-hazardous

TOLUENE-FREE MARKING INK INTRODUCTION

FORD MOTOR COMPANY OF CANADA, LIMITED

ESSEX ENGINE PLANT

Essex Engine manufacturers a variety of engine components (including cylinder heads, blocks, camshafts, crankshafts, connecting rods) and subsequently assembles the Ford 3.8L and the 4.2L V-6 engine. It occupies 1.5 million square feet, employs, 1,400 full-time hourly and salary personnel and produces 625,000 to 675,000 engines annually.

Essex Engine Plant operates an Oily Waste Treatment Plant and has developed an all encompassing solid waste program diverting more than 90% from the landfill. No emissions control equipment such as bag houses, precipitators, etc. have been necessary to maintain process exhausts within the Ontario Ministry of Environment's acceptable parameters. Programs are in place to further reduce landfilled waste, monitor generation of all waste on a monthly basis, eliminate heavy metals, reduce disposable packaging on incoming parts and improve collection of all recyclable material.

Marking inks are used throughout the plant to identify when parts have completed an operation. These inks contain toluene, a pollution prevention initiative and NPRI substance, in percentages between 0.3% and 10%.

All marking inks suppliers were contacted regarding the availability of toluene-free marking inks. An existing supplier indicated such a line of inks was available and the local purchasing department was notified. All future marking inks purchased from this company were toluene-free. The chemical composition of alternative inks were reviewed. The new inks have similar formulations to the previous ink except without the toluene.

Substance(s) Targeted:

Toluene

Targeted Reduction(s):

100% elimination in this application

Results and Advantages:

Toluene-free marking inks were obtained from an existing supplier. As a result, 1.21 tonnes per year toluene has been eliminated from use.

Objective:

To eliminate the use of toluene-containing marking inks.

Project Description:

Marking inks containing toluene were used throughout the plant to identify which parts have been through and completed an operation. Toluene concentration in these inks range between 0.3% and 10%. An alternative marking ink was sought which was toluene-free.

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Product replacement

Environmental Media Addressed:

Air

Capital Investment:

Nil

Barriers Encountered:

Identification of the replacement toluene-free marking ink and coordinating this change with the purchasing and engineering departments took a lot of time and effort. In addition, before the supplier could provide this ink, all previous stocks had to be depleted which delayed the change-over by several months.

ELIMINATION OF LEAD SOLDERING OF FUEL TANK FILL PIPES

GENERAL MOTORS OF CANADA LIMITED

OSHAWA CAR PLANT

The Oshawa Autoplex is the largest North American Automotive facility, occupying a total of 12.2 million square feet of floor area. The Car Assembly plants were converted in early 1996 to assemble the Chevrolet Lumina, the Chevrolet Monte Carlo, the Buick Regal, and the Buick Century sedans. In total, the two Car Assembly plants employ approximately 6,700 people.

A comprehensive waste management system at the facility is comprised of many components including the following:

Waste Water:
All process water from the facility flows to an on-site treatment plant. The plant treats approximately 6,500 m^3 per day in a semi-continuous process that removes large solid material, floating insoluble organic, suspended solid, phosphorous, and heavy metals.

Hazardous Waste:
Drummed hazardous waste such as sealers and spent solvents are labeled at source and are sent to one of four drum marshaling areas within the Autoplex. These drums are then prepared for shipment and are picked up for disposal.

Hazardous bulk solids such as Waste Water Treatment Sludge and Energy From Waste fly ash are bulked in the Hazardous Waste bunkers and are transported to secure landfill for disposal.

Purge solvents for the paint shops in the Car and the Truck Plants are collected in bulk, recycled, and returned for re-use.

Recycling:
Each plant has very successful programs in place for the collection of cardboard, plastics, office paper, newspaper, and popcans for recycling.

At the Oshawa Car Plant in the assembly process, the gas tank and fill pipe were joined with a lead soldering process. This system was the largest source of lead and antimony in the Chassis Plant. The plant personnel given the concern over the lead in the solder sought out alternatives. A number of alternatives were examined. The process was modified in 1996 whereby the tank and fill pipe were joined using a plastic press-fit system. This allowed for the complete elimination and dismantling of the lead soldering process in the plant.

Substance(s) Targeted:
Lead and Antimony

Targeted Reduction(s):
100% of the lead and antimony found in the gas tank soldering process

Results and Advantages:
Approximately 3.6 tonnes of lead and 0.025 tonnes (25 kg) of antimony per year will no longer be used in the Car Chassis Plant.

Objective:

To eliminate lead soldering of the gasoline tank and pipe

Project Description:

The gas tank and pipe traditionally were joined with a lead soldering process.

This system is the largest source of lead and antimony in the Chassis Plant. The process was modified in 1996 to join the tank and pipe with a plastic press-fit system. This allowed the lead soldering process to be dismantled permanently.

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

New technology

Environmental Media Addressed:

Air, water, land

Capital Investment:

Not available

Barriers Encountered:

Developing new technology

ACHIEVING A PCB-FREE FACILITY

CHRYSLER CANADA LTD.

NATIONAL PARTS DISTRIBUTION CENTRE

The National Parts Distribution Centre (PDC) distributes after-market vehicle parts and supplies to all Chrysler Canada Parts Distribution Centres across Canada and to all dealerships in the Ontario Region. The PDC is located in a single 850,000 sq. ft. building on Mississauga Road in Mississauga, Ontario. The PCBs found at the PDC were in the overhead 400 watt mercury vapour lamp ballasts, fluorescent ballasts in office lighting, a contaminated oil transformer and miscellaneous capacitors.

This facility used the services of a PCB destruction unit to clean-up the oil transformer to less than two (2) parts per million PCBs. Chrysler Canada's pollution prevention strategy involves eliminating all PCBs from all its facilities in Canada.

The 400 watt mercury vapour lights located throughout the warehouse were replaced with more efficient 250 watt high pressure sodium lights. Further, the office fluorescents containing PCBs were replaced with new PCB-free fluorescents light fixtures. An electrical contractor combed the entire building to ensure the facility was now PCB-free.

When all the PCBs had been removed and transferred to two approved on-site containers, Director's instructions from the Ontario Ministry of the Environment (MOE) were obtained to transport the PCBs to Alberta. The PCBs were destroyed at the Alberta Special Waste Treatment Centre in Swan Hills, Alberta and a Certificate of Destruction was obtained.

The empty storage site was decertified by the MOE and the PCB Site Certificate was withdrawn. Chrysler Canada's National Parts Distribution Centre is now 100% PCB-free.

Substance(s) Targeted:

PCBs in electrical fixtures and equipment

Targeted Reduction(s):

100%

Results & Advantages:

45 tonnes of PCB waste was removed from the building and destroyed. The facility now has no risk of PCB emissions in event of a fire.

Objective:

To make the National Parts Distribution Centre a PCB-free facility

Project Description:

To remove PCBs from the lighting and transformers and send waste PCBs for destruction in Alberta

Environmental Hierarchy:

Chemical treatment, Thermal destruction

Pollution Prevention Approach:

Product substitution, product modifications, thermal destruction

Environmental Media Addressed:

Land, air

Capital Investment:

$150,000

Cost Savings:

Not available

Barriers Encountered:

None

ELIMINATION OF ISOPROPYL ALCOHOL IN MOULD RELEASE AGENTS
FORD MOTOR COMPANY OF CANADA, LIMITED
WINDSOR CASTING PLANT

The Windsor Casting Plant (WCP) is Ontario's largest iron foundry, which produces automotive engine blocks, bearing caps and crankshafts. There are approximately 950 employees, both salaried and hourly, operating on two eight hour production shifts. The plant, which began operations in 1934, shares a site with the new Windsor Engine Plant. Environmental programs at this facility include particulate and odour reduction programs for air, phenol reduction and recirculation programs for water, and non-production and sand recycling programs for solid residues. The facility is a major user of reclaimed metals as raw materials.

In conjunction with the phase-out of a product at WCP, the use of isopropyl alcohol (IPA) as a mould release agent component was reduced and ultimately eliminated. Consequently, IPA volatilized during the metal pouring process was also reduced and, by the end of 1996, was completely eliminated.

Substance(s) Targeted:

Isopropyl alcohol (IPA)

Targeted Reduction(s):

Complete elimination (100% elimination)

Results and Advantages:

Isopropyl alcohol (IPA) at WCP was eliminated from use in conjunction with the phase-out of an engine product. Between 1994 and 1995, IPA emissions dropped from 31.3 tonnes to 16.9 tonnes. In 1996, 6.4 tonnes of IPA were emitted and by the end of the year IPA use in mould release agents was eliminated.

Objective:

To eliminate the use of IPA containing mould release agents.

Project Description:

IPA was a major constituent of a mould release agent used by WCP. While the majority of the was burned when molten metal was poured into the mould, some volatilized and therefore was released to air. The emissions of IPA at WCP were reduced and ultimately eliminated use in conjunction with the phase-out of a product. New mould release agents currently in use at WCP are water-based.

Environmental Hierarchy:
Pollution Prevention

Pollution Prevention Approach:
Product phase-out and elimination

Environmental Media Addressed:
Air

Capital Investment:
Nil

Barriers Encountered:
None

REDUCTION IN USE OF LEAD ON VEHICLES

GENERAL MOTORS OF CANADA LIMITED

OSHAWA AUTOPLEX – TRUCK ASSEMBLY CENTRE

The Oshawa Autoplex is the largest North American Automotive facility, occupying a total of 12,216 thousand square feet of floor area. The Car Assembly plants build the Chevrolet Lumina, the Buick Regal Custom coupes and sedans, the Regal Limited sedans and the Regal Gran Sport coupes and sedans. The Truck Assembly Centre builds Chevrolet and GMC Pickups – 1/2 ton capacity models in two and four wheel drive, shortbox and stepside extended cab versions. Utilizing 3 million square feet of floor space with state of the art assembly facilities and synchronous manufacturing techniques the Truck Plant produces approximately 1200 vehicles per day. Other operations on the Autoplex site include Stamping, Tri-Link, and Battery manufacturing.

A comprehensive waste management system at the Autoplex facility is comprised of many components including the following:

Waste Water:
All process water from the facility flows to an on-site treatment plant. The plant treats approximately 6,500 m^3 per day in a semi-continuous process that removes large solid material, floating insoluble organics, suspended solid, phophorous, and heavy metals.

Hazardous Waste:
Drummed hazardous waste such as sealers and spent solvents are labeled at source and are sent to one of four drum marshaling areas within the Autoplex. These drums are then prepared for shipment and are picked up for disposal.

Hazardous bulk solids such as waste water treatment sludge and energy-from-waste fly ash are bulked in the hazardous waste bunkers and are transported to secure landfill for disposal.

Recycling:
Each plant has very successful programs in place for the collection of cardboard, plastics, office paper, newspaper, and pop cans for recycling.

Purge solvents for the paint shops in the Car and the Truck Plants are collected in bulk, recycled, and returned for re-use.

Waste Sorting Facility:
The on-site waste sorting facility receives mixed waste compactor boxes from the plant and sorts the material to maximize the recycling stream volume, to ensure Autoplex waste complies with all landfill bans, and to provide a clean stream of combustible material for the on-site energy from waste facility.

The Truck Plant staff commenced a program to improve the transfer efficiency of its e-coat applications to reduce the amount of material usage, particularly lead. The primary source of lead in the Truck Plant is the e-coat paint material which contributes to chip and UV resistance in the paint finish. In 1994-1995, the Truck Plant switched to full body colour-keyed primer surfacer system. During this conversion, the UV blocker traditionally found in e-coat was transferred to the primer surfacer layer through product reformulation. This allowed for a reduction in the e-coat thickness of approximately 30%.

Substance(s) Targeted:
Lead in e-coat paint material

Targeted Reductions:
30% of lead used in the e-coat process.

Results and Advantages:
A reduction in the e-coat thickness of approximately 30% resulted in a decrease of approximately 4 tonnes per year of lead. Unspecified cost savings resulted from this process change.

Objective:
To reduce the amount of lead applied to the vehicle during the e-coat process by modifying the primer surfacer layer formulation.

Project Description:
The primary source of lead in the Truck Plant is the e-coat paint material which contributed to chip and UV resistance. In 1994-1995, the Truck Plant switched to full body colour-keyed primer surfacer system. During the conversion, the UV blocker traditionally found in the e-coat was transferred to the primer surfacer layer.

Environmental Hierarchy:
Pollution Prevention

Pollution Prevention Approach:
Process modification

Environmental Media Addressed:
Air and Land

Capital Investment:
Not available

Barriers Encountered:
None encountered

POWDER ANTICHIP PRIMER PAINT RECYCLING

CHRYSLER CANADA LTD.

WINDSOR ASSEMBLY PLANT

The Windsor Assembly Plant in Windsor, Ontario, manufactures 1,450 minivans per day - Dodge Caravans and Plymouth Voyagers. The assembly plant employs 5,700 people on a three shift basis, in a 3.5 million square feet facility which welds, paints and assembles the popular minivans.

Windsor Assembly won the 1992 Ontario Waste Management Corporation Award for Outstanding Reductions of Hazardous Wastes. Extensive recycle programs are also in place. Last year the plant diverted over 11,000 tonnes from landfills through recycling cardboard, pallets, fine paper, plastics, wood, cooking grease, tires, solvents, newspapers and pop cans.

In 1995 Windsor Assembly Plant modified the paint shop operations to include waterborne base coat paints and full body powder antichip primer paint to reduce air emissions. The powder paint which prevents minivans from stone chipping is applied electrostatically and it is readily attracted to the vehicle. However, some powder paint is carried out as overspray and ends up in drums after being filtered out of the spray booth air stream.

A total of 740 drums of non-hazardous paint powder were landfilled per year from this operation.

Recycling opportunities have been explored and recently the plant was successful in finding an outlet for the powder as an additive to a non-woven bonded padding.

Substances Targeted:

Scrap non-hazardous antichip paint powder

Target Reduction(s):

100% elimination of scrap antichip powder

Results and Advantages:

Recycling 100% of the antichip powder. In addition, 70 tonnes of powder is diverted from the landfill annually

Objective:

To eliminate paint waste from the antichip spray operation

Project Description:

Find recycling opportunities for antichip paint powder

Environmental Hierarchy:

Recycling, Technology advancement

Pollution Prevention Approach:

Recycling

Environmental Media Addressed:

Land

Cost Savings:

$52,360 per year

Barriers Encountered:

None

WASTE WATER TREATMENT FACILITY UPGRADE

FORD MOTOR COMPANY OF CANADA, LIMITED

ST. THOMAS ASSEMBLY PLANT

The Ford Motor Company St. Thomas Assembly Plant manufactures Crown Victoria and Mercury Grand Marquis for the North American market. The plant occupies 2,300,000 square feet and has 13 miles of assembly line. The plant produces 60 units per hour, on two shifts, for a total of 960 vehicles per day and approximately 200,000 per year. The production processes include stamping, body/welding, painting and assembly. Total employment stands at 2,500 hourly personnel supported by a salaried staff of 235. Existing environmental programs at the facility include waste minimization, solid waste, drum recycling, solvent recycling, and waste water improvements.

In 1995 and 1996, the wastewater treatment facility at St. Thomas Assembly Plant was upgraded in a collaboration among Ford, consulting engineers, and the design build contractor. Designed to treat 4,090 m^3 of wastewater per day, the treatment facility processes include chemical treatment, separation and removal of solids, biological treatment, UV disinfection, effluent polishing, and sludge dewatering and drying. As part of the upgrade, the original on-site lagoons will be decommissioned and the existing chemical treatment system will be demolished.

Additional process changes have been made since the launch of the upgraded wastewater treatment facility. Further reducing discharges of the targeted substances.

Substance(s) Targeted:

Chromium, zinc, chlorine

Targeted Reduction(s):

Reduction of the targeted substances discharged in the effluent to the extent possible with improved treatment

Results and Advantages:

The upgrades to the wastewater treatment facility have increased the reliability of the treatment process and improved the quality of the discharged wastewater. Examples of estimated reductions, based on pre-upgrade performance, include:

- total chromium discharge reduced by 44 kg/year (29% reduction)
- total zinc discharge reduced by 380 kg/year (55% reduction).

Chemical treatment of the wastewater has reduced the discharge of hexavalent chromium (Cr^{6+}) to non-detectable levels.

The replacement of chlorine disinfection with UV disinfection has completely eliminated the use of chlorine for wastewater treatment. UV disinfection has effectively reduced *E. coli* counts to low levels and, overall, the use of 1.4 tonnes of liquid chlorine per year has been avoided. In addition, the possible formation of chlorinated organic compounds as treatment artifacts has been eliminated.

Objective:

To reduce the release of materials of concern, including metals and chlorine, to surface water through improved wastewater treatment.

Project Description:

The upgrade of St. Thomas Assembly Plant's wastewater treatment plant facility began in 1995 and was completed in 1996. Similar to other Ford treatment systems, the new industrial wastewater treatment processes involve chemical treatment to reduce hexavalent chromium to the trivalent form, precipitation of solids, and separation and removal of metal hydroxide solids.

The wastewater treatment plant has several unique characteristics necessary because the plant discharges to a low-volume watercourse. High strength wastewater is stored for controlled release to the biological treatment facility, which is followed by effluent filtration and ultimately effluent polishing. A UV disinfection process has been installed to replace chlorine treatment of the effluent. Finally, the sludge is dewatered by frame presses and dried using a novel energy effluent sludge drying system. Sludge is removed from the site weekly. As part of the facility upgrade, the existing chemical treatment system will be demolished and the former settling lagoons will be decommissioned.

Environmental Hierarchy:

Treatment

Pollution Prevention Approach:

Process modification, process change, chemical substitution

Environmental Media Addressed:

Process water discharged to surface water

Capital Investment:

$14 million

Barriers Encountered:

Delays related to environmental approvals

REMEDIATION OF SPENT SAND AREA AND RECYCLE OF SOLIDS

GENERAL MOTORS OF CANADA LIMITED

ST. CATHARINES GLENDALE AVENUE FACILITY

The St. Catharines Glendale Avenue facility is a 2 million plus square foot facility which produces V6 & V8 engines employing approximately 2,500 employees.

Glendale Avenue utilizes dust collectors and oil mist collectors to control air emissions. Process water is treated off-site at the Ontario Street facility. Sanitary effluent is treated on-site through an activated sludge secondary treatment plant. Glendale Avenue also has metal chip, dross, cardboard, fine paper, barrel and pallet collection and recycling programs as part of their solid waste management systems. To manage environmental issues, the plant has a spill response procedure, a "WeCare" program, weekly environmental audits, an asbestos management plan and a program to reduce CFCs and MCFs.

The Glendale Avenue staff commenced a program in 1996 to remediate a spent sand storage area (and adjacent ponds) associated with the operation of the former Glendale Avenue foundry. The spent sand area had been in use for approximately 40 years. The solids were excavated and recycled as a feedstock in cement manufacturing or reused as construction material or capping material an offsite municipal landfill. The work is ongoing through 1998.

Substance(s) Targeted:

Zinc, lead, copper & arsenic

Targeted Reductions:

100% removal and recycling/reuse of spent sand containing metals from the former Glendale Avenue foundry operation.

Results and Advantages:

185,280 tonnes of solids containing zinc, lead, copper and arsenic were excavated. 105,517 tonnes were recycled in cement manufacturing. 32,465 tonnes was reused at a municipal landfill and the remainder sent to an industrial landfill. This resulted in approximately 44.2 tonnes of zinc, 12.2 tonnes of lead, 3.0 tonnes of copper, and 0.77 tonnes (770 kg) of arsenic being removed and recycled/reused.

Objective:

To remove and recycle contaminated spent sand from the Glendale Avenue facility to prevent potential future contamination of soils, groundwater and surface water.

Project Description:

The Glendale Avenue staff commenced a program in 1996 to remediate a spent sand storage area associated with the operation of the former Glendale Avenue foundry. The spent sand area had been in use for approximately 40 years. The solids were excavated and recycled as a feedstock in cement manufacturing or reused as construction or capping material in a municipal landfill.

Environmental Hierarchy:

Recycle, Reuse

Pollution Prevention Approach:

Recycle, reuse

Environmental Media Addressed:

Water and land

Capital Investment:

Part of a multi-million dollar remediation project

Barriers Encountered:

Development and acceptance of recycle market

ALUMINUM DIE CASTING MACHINE MODIFICATIONS

CHRYSLER CANADA LTD.

ETOBICOKE CASTING PLANT

The Chrysler Etobicoke facility is an aluminum diecasting and permanent moulding plant which manufacturers aluminum pistons, master brake cylinders and miscellaneous engine and air conditioning components for the automotive industry. The plant operates on a three shifts per day, seven days per week basis, with most processes continuously operational.

The aluminum die casting process involves pouring molten aluminum into a sleeve of a diecasting machine. A plunger injects the metal into a die under pressure and an aluminum casting is produced after the cooling and removal of the part from the die.

In a conventional "shot" tooling system, the plunger tip consists of 99.5% copper and approximately 0.5% beryllium. Historically, the plunger tip was removed and remachined to fit a smaller sleeve when it became worn. When it was too small to fit the smallest sleeve, the plunger tip was sent off site for scrap metal reclaim.

The Alper shot tooling system was introduced in August 1996 utilizing a steel (piston) ring around the copper/beryllium tip. The new tooling system has a life expectancy 3 to 4 times that of the conventional tooling system. Furthermore, the new shot tips are not machined on site, eliminating exposure to employees who used to work with the plunger tips containing beryllium.

Substance Targeted:

Beryllium

Targeted Reductions:

Elimination of machining beryllium (100% elimination)

Results and Advantages:

No machining of beryllium tips, no employee exposure to by-products caused by machining.

Savings on tips and minimizing use of beryllium. Avoided the usage of 275 kilograms per year of beryllium bearing copper plunger tips.

Objective:
To eliminate beryllium from getting into the environment

Environmental Hierarchy:
Pollution Prevention

Pollution Prevention Approach:
Process modification

Environmental Media Addressed:
Land disposal

Capital Investment:
$40,000

Cost Savings:
$205,000 per year

Barriers Encountered:
None

PLASTIC WASTE RECYCLING

FORD ELECTRONICS MANUFACTURING CORPORATION

MARKHAM PLANT

The Ford Electronics Markham Plant manufactures electronic devices and modules for automobiles worldwide. The plant encompasses 289,000 square feet and is located in the township of Markham, Ontario. Total employment stands at 1,400 production personnel supported by a salaried staff of 210. Product diversity ranges from safety and security control modules used in anti-theft, vehicle restraint systems and airbags, to driver interactive and convenience products such as electronic instrument clusters, vehicle maintenance monitors and remote keyless entry computers. The plant assembles printed wiring boards and electronic control modules from component parts. The production of components includes automated leaded component insertion and surface mount device placement. For printed wiring board, manufacturing involves manual and automated odd shaped component insertion, soldering and in-circuit testing. The facility conducts final assembly of electronic devices including testing. Existing environmental programs at the facility include Volatile Organic Compounds (VOC) reduction, CFC elimination, lead reduction, organic waste diversion, and waste minimization and packaging reduction programs.

At the Markham plant, many different types of plastic wastes contribute to approximately one quarter of the total plant wastes by weight. Efforts have been made to identify and source separate these plastics as much as practical, and currently polystyrene, polyvinyl chloride (PVC), fibreglass-reinforced plastic (FRP) and low density polyethylene (LDPE) are recycled. Overall, the Markham plant is recycling 76% of the total wastes, and approximately 80% of the total plastic wastes generated.

Substance(s) Targeted:

Polystyrene, polyvinyl chloride (PVC), fibreglass-reinforced plastic (FRP), low density polyethylene (LDPE)

Targeted Reduction(s):

2% per year improvement in recycling

Results and Advantages:

The Markham Plant is recycling 76% of its total wastes generated and, consequently, is diverting this material from landfill. Amounts of recycled plastics material by type include:

- 50 tonnes/year polystyrene
- 80 tonnes/year PVC
- 200 tonnes/year FRP
- 5 tonnes/year LDPE

The plant has been honored by the Canadian Polystyrene Recycling Association for its long-standing efforts in recycling polystyrene.

Objectives:

To reduce the amount of plastic waste sent to landfill by recycling the plastic waste and reusing it in new applications.

Project Description:

At the Markham plant, a program was initiated to identify recyclable plastic materials and reduce the total amount of plastic waste sent to landfill. Four types of plastic wastes were targeted for recycle: polystyrene, PVC, FRP and LDPE. Polystyrene waste comes from styrofoam packaging, polystyrene reels and trays, and food containers. PVC waste from Markham is typically present in connector tubes, IC tubes and certain component trays. FRP is used in circuit board borders, or "breakouts," which are made of epoxy reinforced with fibreglass material. FRP accounts for the greatest portion of the plastic category, accounting for 30% of the total plastic wastes.

Recycling options for each of the plastic wastes were identified. Polystyrene material is recycled into, for example, stationery, office supplies, and compact disc holders. To date, enough polystyrene material has been recycled to form the equivalent of approximately 30 million foam beverage cups. To reuse the PVC material, a source was found that is capable of regrinding PVC items into pellets, which are then used to remanufacture new PVC items such as water hoses and drainage pipes. The FRP waste is recycled into, for example, architectural panels, furniture, and office supplies. The Markham plant uses planters made of its own recycled FRP circuit board borders.

Environmental Hierarchy:

Recycling

Pollution Prevention Approach:

Waste diversion

Environmental Media Addressed:

Land (Solid Waste)

Capital Investment:

Nil

Barriers Encountered:

Accountability of intangible costs and benefits, floor space allocation

REDUCTION IN USE OF PAINT PURGE

GENERAL MOTORS OF CANADA LIMITED

OSHAWA AUTOPLEX – TRUCK ASSEMBLY CENTRE

The Oshawa Autoplex is the largest North American Automotive facility, occupying a total of 12,216 thousand square feet of floor area. The Car Assembly plants build the Chevrolet Lumina, the Buick Regal Custom coupes and sedans, the Regal Limited sedans and the Regal Gran Sport coupes and sedans. The Truck Assembly Centre builds Chevrolet and GMC Pickups -1/2 ton capacity models in two and four wheel drive, shortbox and stepside extended cab versions. Utilizing 3 million square feet of floor space with state of the art assembly facilities and synchronous manufacturing techniques the Truck Plant produces approximately 1200 vehicles per day. Other operations on the Autoplex site include Stamping, Tri-Link, and Battery manufacturing.

A comprehensive waste management system at the Autoplex facility is comprised of many components including the following:

Waste Water:
All process water from the facility flows to an on-site treatment plant. The plant treats approximately 6,500 m^3 per day in a semi-continuous process that removes large solid material, floating insoluble organics, suspended solid, phosphorous, and heavy metals.

Hazardous Waste:
Drummed hazardous waste such as sealers and spent solvents are labeled at source and are sent to one of four drum marshaling areas within the Autoplex. These drums are then prepared for shipment and are picked up for disposal.

Hazardous bulk solids such as waste water treatment sludge and energy-from-waste fly ash are bulked in the hazardous waste bunkers and are transported to secure landfill for disposal.

Recycling:
Each plant has very successful programs in place for the collection of recyclables including cardboard, plastics, office paper, newspaper, and pop cans among others.

Purge solvents for the paint shops in the Car and the Truck Plants are collected in bulk, recycled, and returned for re-use.

Waste Sorting Facility:
On-site waste sorting activities are performed to maximize the recycling stream volume, to ensure Autoplex waste complies with all landfill bans, and to provide a clean stream of combustible material for the on-site energy from waste facility.

The Truck Plant staff commenced a program to reduce the amount of its purge solvents as part of the implementation of the Chemicals Management System at the Truck Plant. This involved the introduction of a single vendor to manage the supply of the most direct chemicals. This supply arrangement, which includes purge solvent, provided some incentive for the Chemical Manager to initiate material reductions. The Chemical Manager in conjunction with Paint Shop personnel were able to implement numerous changes including a reduction in purge frequency, enhanced air/solvent purging, and reductions in the amount of paint lines requiring a purge. These changes commenced in 1996 and are continuing to 1998.

Substance(s) Targeted:

Paint purge which contains acetone, xylene, toluene and methyl isobutyl ketone (MIBK)

Targeted Reductions:

30%+ in acetone, xylene, toluene, and methyl isobutyl ketone

Results and Advantages:

Purge solvent usage was reduced by over 1 litre/vehicle in 1996. This reduction will result in an estimated 200 tonnes reduction in VOC's on an annual basis. These process changes support the cost and chemical reduction objectives included in our Chemical Management Program and reduced the NPRI reportables.

Objective:

To reduce the amount of purge solvent used in the Truck Plant for line operations.

Project Description:

The implementation of Chemicals Management at the Truck Plant in 1996 involved the introduction of a single vendor to manage the supply of most indirect chemicals. This supply arrangement, which includes purge solvent, provided some incentive for the Chemical Manager to initiate material reductions. The Chemical Manager in conjunction with Paint Shop personnel were able to implement numerous changes including a reduction in purge frequency, enhanced air/solvent purging, and reductions in the amount of paint lines requiring a purge. These changes commenced in 1996 and are continuing to 1998.

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Process modification

Environmental Media Addressed:

Air and land

Capital Investment:

Not available

Barriers Encountered:

None encountered

PHASE SEPARATION TECHNIQUE UTILIZED IN PAINT PIT CLEAN-OUTS

NAVISTAR INTERNATIONAL CORPORATION OF CANADA

CHATHAM ASSEMBLY PLANT

The Chatham Assembly Plant manufacturers Navistar's premium class 8 trucks. The plant, which is in the process of expanding and modernizing, is a 79,000 square foot assembly operation located on 80 acres of property and employs approximately 2000 people, operating on a combined 2 and 3 shift basis. The truck assembly operations start in the frame assembly operation followed by chassis paint and chassis assembly. Components such as rear axles, transmissions and engines, are assembled into the trucks as they pass through the initial stages of the chassis assembly department. The truck cabs are sent to the paint preparation and paint process followed by the cab and sleeper trim process. Cabs and hoods are assembled onto the trucks at the chassis assembly plant.

The trucks produced at the Chatham Plant are custom designed, based on customer specifications. A range of styling features are available, and sleeper trucks are suited for truckers that haul over long distances. The sleeper cabs may include features such as televisions, microwaves, refrigerators, and satellite/computer communications, and could have a variety of cab layouts. Approximately 850 suppliers provide the over 13,000 different components that are assembled into each truck.

Environmental programs at the facility include an in-house environmental management program for hazardous waste and recycling. Currently, the facility recycles 80% of the non-hazardous wastes and 94% of its hazardous waste. The facility has won various awards including the recent 1996 Recycling Council of Ontario's Waste Minimization Silver Award.

In 1989, the plant converted its paint to high solids, low VOC chemistry to reduce airborne emissions. In 1992, a centrifuge solids removal system was installed in the main paint solids collection pit to efficiently dewater the solids. The results are a 33 percent reduction by weight and a 49 percent reduction by volume of paint solids. The combination of the chemistry change and the installation of the centrifuge have made possible a reclassification of the paint solids from a provincial code 145H hazardous to 145N registerable non-hazardous waste. This change in class has now allowed a change in the disposal site, from hazardous chemical landfill to municipal landfill, at an estimated annual savings in disposal costs of $82,000.

In 1994, an additional centrifuge was installed in the main paint facility and a new building and centrifuge was installed above the chassis paint pit. The results yield an annual reduction of 386 tonnes of landfillable paint solid at a cost savings of approximately $117,000 per year. The cost of the project was $195,000. In addition, periodic purging of water from the pits has reduced the need for pit clean-outs thereby reducing the number of times per year that sludge is sent to landfill and also reducing the cost of landfilling. 1996 was the first complete year utilizing the new "Phase Separation" method for the paint pit clean-outs. In the past, this twice yearly process involved draining the two paint pits into tankers with subsequent incineration and landfill as 145H waste. With the utilization of a Phase Separator, the pit contents are passed through a filter media which removes the solids, allowing reclassification as 145N. The filtered and treated water is clean enough to be re-introduced into the paint process for reuse and is within the Municipal Sewer Use by-law limits. The waste reduction achieved by this process reduced the facility's annual disposal by 88%, from 528 tonnes to 62 tonnes per year with associated cost savings.

Substance(s) Targeted:

Hazardous liquid waste

Targeted Reduction(s):

88% to be diverted from incineration and hazardous landfill

Results and Advantages:

- All waste is now non-hazardous (reclassification of waste type)
- Current, simple technology utilized
- Waste processing time reduced
- Cost savings of over $250,000 per year
- Other Navistar facilities examining the possibility of duplicating the process at their respective locations

Objective:

To reduce liquid and solid hazardous waste from incineration and landfill

Project Description:

Through partnership between Navistar and BFI, all avenues were investigated to reduce all wastes at the facility through various methods

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Process change (Alternative method)

Environmental Media Addressed

Air and land

Capital Investment:

Nil

Barriers Encountered:

None