

SIXTH PROGRESS REPORT

FROM THE TASK FORCE

OF THE

CANADIAN AUTOMOTIVE MANUFACTURING POLLUTION PREVENTION PROJECT

CVMA PROJECT

SEPTEMBER 1999

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. DaimlerChrysler Canada Inc., 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.

ACKNOWLEDGEMENTS

The Task Force Members acknowledge the dedication and significant action towards pollution prevention initiatives of all the employees of DaimlerChrysler Canada Inc., Ford Motor Company of Canada, Limited and General Motors of Canada Limited. Without their hard work and dedication, the success and results demonstrated in the annual reports since 1992 could not have been achieved. Their ongoing commitment and their efforts should position each company so that they can meet future environmental management challenges and the changing regulatory landscape.

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I. OVERVIEW

1. Introduction

The Task Force of the Canadian Automotive Manufacturing Pollution Prevention Project is pleased to present its sixth progress report on the voluntary pollution prevention efforts of the participating member companies of the Canadian Vehicle Manufacturers' Association (CVMA).

The report captures the progress including the results and activities since the Fifth Progress Report released in June 1998. Previous reports including the reported case studies can be found on Environment Canada's Green Lane under the URL address: www.cciw.ca/OR/green-lane/laws.html

The sixth report demonstrates the continued commitment by the participating CVMA member companies to pollution prevention and the ongoing reductions in the targeted substances that have resulted from implementing pollution prevention plans within plant facilities. In this report, 24 new case studies are highlighted, each of which is innovative in the degree of complexity, cost, and implementation approach. The case studies, as in previous reports, 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 case study format in this report has been enhanced to assist the reader in gaining a better understanding of the pollution prevention activity that was undertaken by the facilities.

On May 29th, 1992, the Canadian Automotive Manufacturing Pollution Prevention Project (the CVMA P2 Project) was announced by the signing of a Memorandum of Understanding (MOU). The CVMA P2 project was renewed in 1994 with some revisions to its terms of reference and communications plan. The Memorandum of Understanding expired in September 1995. The companies and government continued the project's activities through early 1998 while discussions continued on a possible renewal. In the spring 1998, the public was consulted on the renewal of the MOU and its proposed terms and conditions. Following the consultation, minor modifications were made to the renewal terms and the MOU was renewed again in November 1998.

The MOU is a cooperative effort between the participating members of the Canadian Vehicle Manufacturers' Association (CVMA), the federal Department of Environment (Environment Canada) 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. DaimlerChrysler Canada Inc., 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 renewal demonstrates the auto industry and government commitment to voluntary pollution prevention actions.

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, DaimlerChrysler Canada Inc., 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:

DaimlerChrysler Canada Inc.	- Paul Hansen, Manager, Environmental Affairs (signatory)
Environment Canada	- Tom Tseng, Manager, Toxics Prevention Division (signatory) - Brad Cumming, Head, Pollution Prevention and Mining
Ford Motor Company of Canada, Limited	- Christina Fung, Manager, Environmental Quality - Blake Smith, Director, Environment, Energy and Vehicle Safety (signatory)
General Motors of Canada Limited	- Bruce Reid, Director, Environmental Activities (signatory) - Faye Roberts, Manager, Government Relations
Canadian Vehicle Manufacturers' Association	- Mark Nantais, President (signatory) - Yasmin Tarmohamed, Director, Environment, Health and Safety
Ontario Ministry of the Environment	- Brian LeClair, Senior Advisor, Environmental Partnerships Branch (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 DaimlerChrysler Canada Inc. (formerly 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 task force issued its Fifth Progress Report in 1998. The report can be found on Environment Canada's Green Lane Website at www.cciw.ca/glimr/data/poll-prev-auto2/fifth-cdn-auto.pdf. The Fourth Progress Report which includes the MOU can be found on at www.cciw.ca/OR/glimr/metadata/poll-prev-auto1/intro.html.

The MOU was subject to renewal for an additional two-year time period to December 31, 2000 once the public was consulted. The draft MOU renewal addendum was posted on the Green Lane and the Ontario Environmental Bill of Rights Registry (EBR) for public comment for a 30-day time period in March 1998. The CVMA P2 Project was renewed on November 3, 1998 by signing of the MOU by the Chief Executive Officers of the participating automotive companies and the federal and Ontario Ministers of the Environment (see Appendix I). The renewal conditions are presented on Appendix II.

II. ADVANCEMENT OF P2 WITHIN THE AUTO COMPANIES

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

1. DaimlerChrysler Canada Inc.

DaimlerChrysler is committed to enhancing the quality of life and the environment in the communities and societies we serve. Environmental protection is one of the fundamental corporate objectives of the DaimlerChrysler Group. In this context, environmental protection is an integral component of the corporate strategy, designed to ensure long-term value creation.

DaimlerChrysler's goal of maximum product quality includes compliance with stringent environmental standards and careful treatment of the natural foundations of life. Accordingly, our approach to environmentally acceptable product design requires careful consideration of the entire product life cycle from design, production and use to disposal or recycling. The Environmental Protection Guidelines approved by the Board of Management define the environmental policy of the DaimlerChrysler Group and describe the commitment to integrated environmental protection that addresses environmental impacts at their roots, assesses in advance the ecological implications of production processes and products, and takes these findings into account in corporate decision-making. Appropriate control and monitoring procedures and measures have been

implemented. Responsibility for the implementation of and adherence to environmental protection measures has been assigned to specific employees in all functional areas, from development and production to sales and service, and at all corporate staffs.

Environmental Protection Guidelines of DaimlerChrysler

The Environmental Protection Guidelines are binding for all the Group's employees and at all corporate locations. Accordingly, the Group supports and encourages all employees to put environmental protection into practice at the workplace at his or her own initiative. Measures implemented at the various corporate locations are regularly assessed and subject to a process of continual improvement.

In order to comply with its self-imposed environmental protection standards, the DaimlerChrysler Group draws up its own environmental goals. The ecological programs required to meet these goals are monitored through a comprehensive auditing process aimed at measuring compliance with procedures and regulations, and when necessary, corrective actions are taken to improve performance. The underlying Environmental Management System is coordinated by the Chief Environmental Officer, who reports to the Board of Management on these matters at regular intervals. A verifiable environmental report, published annually, documents the Group's activities and achievements.

We also will endeavor to ensure that our Environmental Protection Guidelines are accepted in joint venture partnerships. Our responsibility for the environment does not stop at our Group's doors. Accordingly, in addition to our own environmental protection activities, DaimlerChrysler will promote the development of intelligent ecological solutions and encourage the international development of environmental technology. Our objective is to retain and further develop transportation products and systems which cater equally to the requirements of the individual, society and the environment.

1. We face the environmental challenges of the future by working continuously to improve the environmental performance of our products and our operations.

Compliance with environmental legislation and regulations is a matter of course for DaimlerChrysler. To ensure sustainable development, the Group is also committed to the active and ongoing development of environmental protection. This includes the manufacturing processes and our products. DaimlerChrysler also contributes its expertise to non-corporate scientific, technical and governmental activities designed to improve the environment.

The Environmental Protection Guidelines of the DaimlerChrysler Group are binding for all employees and at all corporate locations. Particular responsibility rests with managerial staff: through their example, they make an active contribution to the further development of our environmental policy and of ecological awareness among the Group's employees, as well as helping to anchor environmental protection in our corporate culture.

2. We strive to develop products which in their respective market segments are highly environmentally responsible.

Our approach to environmentally acceptable design covers the entire product spectrum of the DaimlerChrysler Group, taking into account the product life cycle from design through disposal or recycling. Continuously improving the environmental performance of our products is one of our important goals. DaimlerChrysler is committed to the ongoing pursuit of this objective, especially in its research and development activities.

3. We plan all stages of manufacturing to provide optimal environmental protection.

DaimlerChrysler sees itself as a leader in the ongoing development of environmentally responsible production technology which minimizes the burden on the environment. This includes proactive behavior to prevent or minimize the impact of accident which may adversely affect the environment. Particular emphasis is given to the application and continuing development of technologies which save energy and water, and which are characterized by minimal emission and waste levels. This includes the development of effective environmental assessments, emission controls, reuse and recycling strategies. DaimlerChrysler aims to achieve closed-loop material cycles. Our ultimate goal is waste-free production.

DaimlerChrysler requires its suppliers and contractual partners to comply with all applicable laws and regulations and encourages them to pursue proactive environmentally responsible practices. Contractors working on DaimlerChrysler properties also must comply with the location's own standards and requirements.

4. We offer our customers ecologically oriented service and information. Our customers should be able to use the DaimlerChrysler Group's products in an environmentally acceptable manner.

DaimlerChrysler therefore provides its customers with products with a long service life in an effort to conserve natural resources. Our service outlets work to provide optimal information and expert service on environmental matters. Customers also receive comprehensive and competent advice on eco-friendly motoring.

5. We endeavor to achieve exemplary environmental performance worldwide.

DaimlerChrysler manufactures and markets its products internationally. The Group endeavors to behave in an exemplary manner in environmental protection at all of its plants and service outlets around the world and to continually enhance environmental protection through the application of progressive environmental management.

For a global player, however, taking responsibility for environmental protection seriously also means looking beyond our boundaries. At its locations around the world, DaimlerChrysler supports and encourages the cooperative development of environmentally superior technology and management methods throughout industry and the public sector. In addition we cooperate with authorities to develop technically and financially sound, environmentally responsible laws and regulations.

6. We provide our employees and the public with comprehensive information on environmental protection.

At DaimlerChrysler we believe that only a policy of openly providing information on environmental protection measures and reporting on achievements and problems in the implementation of these measures will motivate employees and create credibility in the general public. The Group employs the available personnel development, employee training and information measures to transform environmental awareness into specific employee behavior.

As a corporate member of the community, DaimlerChrysler actively seeks dialogue with the public on important environmental issues and works cooperatively with other groups, institutions and parties to protect and conserve the environment.

Employees, customers and the general public are provided with the information they need to understand the ecological impact of the products and corporate activities of DaimlerChrysler.

For further information on the environmental policies and performance of DaimlerChrysler, please refer to our 1999 Environmental Report at www.daimlerchrysler.com.

Pollution Prevention at DaimlerChrysler:

Pollution prevention is an economically beneficial means of reducing the risks and restrictions on DaimlerChrysler Corporation'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. Pollution prevention and life cycle management are supported within DaimlerChrysler by a hazardous materials screening system. The screening system is integrated into DaimlerChrysler Corporation's parts approval system and is being implemented in partnership with suppliers, who are responsible for certifying that products and parts meet the DaimlerChrysler criteria for regulated and hazardous materials. An on-line screening system allows suppliers access to DaimlerChrysler product and materials screening criteria creating a more direct opportunity for communication and participation in pollution prevention programs. New products solvents are screened using a restricted list and prevented from entering through the central computerized purchasing system. Currently, there are 103 substances on the restricted chemicals list which are targeted for elimination, reduction or substitution.

DaimlerChrysler Canada 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. All plant facilities and parts distribution centres are encouraged to document success stories on pollution prevention and recycling and to submit these success stories annually for a possible DaimlerChrysler CHEER Award.

Life Cycle Management at DaimlerChrysler

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. DaimlerChrysler'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 DaimlerChrysler'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.

DaimlerChrysler's Canadian Programs

A senior management Environmental Committee oversees the environmental activities, including pollution prevention at DaimlerChrysler in 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 Environmental Specialists who oversee the environmental and energy activities within the plant. To assist in pinpointing pollution prevention chemicals they are given the production and non-production part numbers containing the 103 targeted substances as identified by the corporate hazardous materials computer system. 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 with annual updates on their goals and achievements. Out of the initial 65 candidate substances, DaimlerChrysler 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 six years since 1993. DaimlerChrysler Canada has achieved a 70% reduction in NPRI emissions since 1994. Only 4 out of 5 facilities are required to report to the NPRI with the number of substances ranging from 2 to 15 in 1998 per facility.

DaimlerChrysler Canada has voluntarily participated 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 to reduce the usage by 50%. DaimlerChrysler views ARET as a complementary program to the CVMA Pollution Prevention Project and is on track to meet its commitment of 50% reduction of the substances since 1993.

An "Enhanced Environmental Management System" (EEMS) is being launched at all DaimlerChrysler Corporation's production facilities in North and South America. By the end of 2000 all manufacturing facilities in Canada will have EEMS in place and the plan is to have them certified to the ISO 14001 standard.

2. Ford Motor Company of Canada, Limited

At Ford Motor Company of Canada, Limited, dedication to the environment is a way of business. This commitment is embodied in the company's environmental policy. Ford's Environmental Policy, formally in effect since 1989, was last updated in 1999. The key elements of the policy are summarized in the following business practices which reflect the company's environmentally responsible principles:

- consideration of potential environmental effects is an early, integral part of the planning process;
- when necessary and appropriate, we establish and comply with standards of our own, which may go beyond legal mandates;
- the issue of cost alone does not preclude consideration of possible alternatives; and
- priorities are based on achieving the greatest anticipated practical benefit while striving for continuous improvements.

Under the Ford Environmental Policy, the management of each activity is responsible for making environmental protection a priority and committing the necessary resources. Employees at all levels are expected to carry out their responsibilities. Annual reports to the Board of Directors include an environmental performance review of facilities.

The Ford Environmental Policy is cascaded down to operations through the development of the Manufacturing Environmental Strategy, which has been in effect since 1994. This strategy aims to prevent source pollution at the early stages of process and product development, address facility environmental planning needs, and plan for recyclability. Four key areas are addressed:

- materials;
- processes;
- facilities; and
- suppliers.

The material strategy aims 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.

The process strategy mainly addresses product design and manufacturing planning. It ensures the assessment of environmental impact early in the development stage and consideration of alternatives which support the company's environmental goals. It also includes the development of energy efficiency improvement commitments and action plans to be part of each facility's annual business plan and budget.

The strategy for facilities mandates the development of contingency plans to handle potential environmental emergencies. The plans are reviewed annually and must address spill prevention, employee training, incident control, and material containment.

The supplier strategy requires communications with the supplier community to assure that they recognize Ford's commitment to environmental matters, without compromise to the principles of quality, cost, and customer satisfaction. Suppliers are 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.

By virtue of its Company Directive "Environmental Strategy, Planning and Implementation", each 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 wastes 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**."

Incorporation of the Ford Environmental Policy in facilities has been effectively achieved through the global implementation of the Ford Environmental System, a series of procedures which require each facility to continuously improve its environmental performance by setting objectives and targets. The common framework used to develop the Ford Environmental System was ISO 14001.

In 1998, Ford of Canada became the first automotive company with multiple locations to have all manufacturing facilities registered to ISO 14001. Three Canadian facilities represent first in their categories: Oakville Assembly Plant (first vehicle assembly plant in North America), Windsor Aluminum Plant (first casting plant in the world), and Visteon Electronics Plant (first electronics plant in Canada).

The Ford Environmental System provides a mechanism for each facility to identify the aspects of its activities which may have an impact on the environment, to set local objectives and targets for improvements, and to implement procedures and work practices suitable to its activities. The facility is subject to an annual third party audit in order to maintain its registration.

The Ford Environmental System includes a global procedure which addresses prevention of pollution and waste minimization. Each facility is responsible for monitoring its environmental wastes and emissions, identifying opportunities to reduce the volume and/or toxicity of materials, and developing goals and programs to achieve continual improvements.

Overall, Ford's National Pollutant Release Inventory (NPRI) emissions have been reduced by more than 50% since 1993, regardless of its production increases of 24% for vehicles and 148% for engines. More importantly, these milestones have been achieved in advance of regulatory requirements.

Vehicle programs have incorporated the 'Design for the Environment' concept as part of the vehicle design process. This includes recycling as well as elimination of materials of concern, waste minimization, and other 'green' targets. The goal is to divert the amount of materials from landfill by facilitating the recycling of Ford products and their components at the end of their life cycle.

Ford has committed to achieve 90% returnable container usage by 2001. All incoming parts in disposable packaging or containers are targeted for reduction. Ford also uses recycled materials wherever feasible, and has established recycling guidelines for its engineers and suppliers.

Ford vehicles are manufactured with recycling in mind and show innovative applications for salvaged materials by renewing them into new components. The vehicle design process also focuses on the development of alternative, cleaner fuel options.

Ford recognizes the significance of employee environmental awareness and involvement. All employees have a role in environmental management and are familiar with the company's environmental policy and the environmental aspects associated with their functions. Each facility has a formalized environmental training program in place.

Regular programming on Ford's Communication Network, or FCN, electronic mail, and other forms of communications keeps employees up to date on environmental activities. In addition, the company's pollution prevention initiatives are highlighted in the annual Environmental Report and the Environment section of the Ford Internet web site.

The company has developed training programs to facilitate the pollution prevention/waste minimization team process. A Design for the Environment training program was launched to increase the awareness of product engineers concerning the environmental effects of their design decisions. Training modules are also being developed by Ford to provide assistance to dealerships and suppliers in their ISO 14001 implementation efforts.

The Green Committee is a group of environmental personnel made up of senior management, facility operations and divisional representatives, and is co-chaired by the CEO and the Director of Environment, Energy and Vehicle Safety. This committee, created in 1990, continues to be an effective forum to facilitate two-way communications on best practices in pollution prevention. This activity is supplemented by annual Ford/Canadian Auto Workers environmental meetings to encourage cooperative environmental efforts in the facilities.

With these programs and initiatives, Ford continues to strive to achieve the highest level of environmental excellence.

3. General Motors of Canada Limited

General Motors of Canada Limited (GMCL) 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.

During 1999 General Motors formed a Global Environmental Issues Team to address issues that are Global in nature and to leverage knowledge across the Corporation. GM Canada has a representative on that team and is an active participant in the development of global metrics.

GM Canada continually reviews its Environmental Management System (EMS) to ensure that it reflects the current developments in the environmental field and to recognize changes in corporate policies, regulations and international standards. While GM has had environmental management staffs and systems in place since 1973, these systems are currently being reviewed and enhanced to ensure that each of the facilities is in conformance to the ISO14001 based GM EMS specifications by December 2001. As the plants implement the GM EMS, they will be certified to ISO 14001 by a third party registrar.

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 1998 data was released during the Fall of 1999. 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 our environmental engineers are properly trained to provide the necessary technical support for the various programs, GM Canada updates and delivers on a regular basis an extensive environmental training program for its 40 environmental officers. The most recent program was delivered in August of 1999 with particular emphasis on Environmental Management Systems.

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 Canada's supplier development team works with suppliers to assist them in identifying waste of materials and energy in their operations. GM Canada 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.

GM 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. GMCL has initiated the concept of Resource Management using a single contractor to handle all wastes originating at a manufacturing site. This approach allows the contractor to assist in the development of waste data and in identifying additional opportunities for waste re-use, reduction or recycling. 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. GMCL has worked closely with potential suppliers of chemical management systems and has built into its specifications, requirements for screening, chemical use reduction and tracking. Similarly, our environmental engineers are working closely with paint and other suppliers to reformulate products that have the potential to adversely affect the environment.

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 Canada Limited have signed onto the Voluntary Climate Challenge Program and reported on their energy usage and greenhouse generation annually since 1995. Energy conservation projects and programs have been developed to reduce our dependence upon fossil fuels and reduce greenhouse gas emissions. General Motors of Canada Limited has not only held our Greenhouse gas emissions below 1990 levels but has actually achieved a 37% reduction in equivalent carbon dioxide emissions since 1990.

A program has also been developed to address the "PCB" based transformer equipment that has been in use in some of its facilities. A planned replacement program is underway to retrofit or replace this equipment. To date 30 transformers have been removed from service and the associated PCBs destroyed. An additional 29 transformers are scheduled for replacement by the end of the 2000 calendar year. As a facility is cleared of PCBs, a third party audit is conducted to substantiate the completion of such programs.

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 material safety data sheets or "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. Through this and other programs we have been able to reduce our NPRI emissions by approximately 40% since 1995.

General Motors have established and published the following environmental goals for attainment by year end 2002:

- 30% reduction in Non-Product Output based upon 1997 levels
- 20% reduction in energy usage based upon 1995 levels
- 20% reduction in utility usage based upon 1995 levels.

Through the use of the above mentioned programs General Motors of Canada Limited fully expects to meet these goals.

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 Limited strives to fulfill its ongoing commitment to the environment.

III. DEVELOPMENT AND IMPLEMENTATION OF P2 PLANS

1. List of Targeted Substances and 1998/1999 Inventory Results

(a) List of Targeted Substances:

The initial list of substances targeted under the CVMA P2 Project Project was identified and agreed upon in October 1992. The list included non-halogenated hydrocarbons, halogenated hydrocarbons, metals and pesticides. The list is shown in Appendix III. The 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 list has served to focus the companies' efforts towards pollution prevention.

In 1994, the substances identified under the Canada-Ontario Agreement (COA) were added to the existing list of targeted substances. The COA list identified two lists of substances (Tier I and Tier II) for voluntary action and/or regulatory action. Of the 36 substances, 18 were included in the initial list (see Appendix III).

In 1997 while discussions were focused on the potential renewal of the MOU, inventory scans were being conducted by the companies for the initial project list of substances and the COA Tier I and Tier II lists targeted for reduction and/or elimination under the project. Additional scans were conducted for Schedule I substances under the Canadian Environmental Protection Action (CEPA) as at January 1995 and the Priority Substances List 1 (PSL1) toxic substances. For the CEPA substances, scans were conducted where Chemical Abstract Service (CAS) numbers were available. Only those substances found in the scan were targeted for action (See Appendix III for the list).

Again 1998/1999, the companies conducted a new inventory scan as part of their renewed commitment. The initial list of 65 substances, COA substances and the current substances on the CEPA Schedule 1 and those which were assessed as toxic under the PSL 1 assessment were scanned. Similar to the previous year, only those CEPA substances found in the inventory were added to the list for action.

The task force recognized the need to streamline the list so that actions could be focused on a condensed list of substances. In addition, it was felt that the reader should be provided with a clear indication of which substances were subject to pollution prevention activities. A number of the substances in the CEPA lists were already being targeted under the program. The substances added in 1998/1999 are found in Appendix IV. Inventory scan results from 1993, 1995, 1997 and 1998/1999 can also be found in Appendix IV. The appendix outlines the substance, the CAS number and the list on which the substance belongs.

(b) Inventory Results from 1998/1999:

In 1998 and 1999, the participating companies conducted inventory scans for the initial list of 65 substances, the COA substances, CEPA Schedule 1 and PSL 1 toxic substances. In total, an inventory was conducted for 112 substances or groups of

substances.

The results identified 34 of the 112 substances in the companies' manufacturing operations. A majority of the substances were already being targeted as part of the initial list of substances and COA substances. Of the 34, 8 substances appear on the CEPA lists. The inventory results are presented in the Table below.

Table 1. Substances found in CVMA Facilities in 1998/1999

Halogenated Hydrocarbons	Non-Halogenated Hydrocarbons	Metals	CEPA Schedule 1 or PSL 1 toxics
Dichlorobenzenes Methylene chloride Polychlorinated biphenyls (PCBs) ¹ Tetrachloroethylene ² Trichloroethylene ²	Benzene ² Ethylbenzene Phenol Phthalates: butylbenzyl phthalate di-n-butyl phthalate diethyl hexyl phthalate ² dimethyl phthalate Polyaromatic Hydrocarbons (PAHs) ³ : naphthalene Toluene	Antimony Arsenic ² Beryllium Cadmium ² Chromium ² Copper Lead ⁴ Mercury ⁴ Nickel ² Selenium Silver Zinc	Asbestos ⁵ Bromochlorodifluoromethane ⁶ Bromotrifluoromethane ⁶ 1,1,1-trichloroethane Chlorofluorocarbons Bischloromethyl ether Fluorides (inorganic) Refractory Ceramic Fibres ⁷

Note:

¹ = PCBs are found in old equipment such as transformers and ballasts

² = Also a CEPA Schedule 1 substance

³ = PAHs were also found in the CEPA inventory scan; PAHs are already targeted under the initial

list of 65 substances and the COA list

⁴ = Also a CEPA Schedule 1 substance

⁵ = Asbestos is of health and safety concern rather than an environmental one; extensive health and

safety legislation exists to address asbestos

⁶ = Found in halon systems such as fire protection systems

⁷ = Refractory ceramic fibres are used in manufacturing processes (e.g. casting operations); no suitable alternatives are currently known; concern only from a health and safety perspective

2. List of Pollution Prevention Project Facilities

The following Ontario facilities of DaimlerChrysler, Ford and General Motors fall under the Memorandum of Understanding, many of which, have submitted the case studies which appear in this report. However, this by no means implies that pollution prevention activities are not undertaken at locations across Canada.

DaimlerChrysler Canada Inc.

- ∇ 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, Mississauga

Ford Motor Company of Canada, Limited

- ∇ Oakville Assembly Plant, Oakville
- ∇ Ontario Truck Plant, Oakville
- ∇ St. Thomas Assembly Plant, St. Thomas
- ∇ Windsor Engine Plant, Windsor
- ∇ Essex Engine Plant, Windsor
- ∇ Windsor Casting Plant, Windsor
- ∇ Essex Aluminum Plant, Windsor
- ∇ Windsor Aluminum Plant, Windsor
- ∇ Windsor Engine Plant, Windsor
- ∇ Bramalea Parts Distribution Centre, Bramalea
- ∇ Visteon Electronics Plant, Markham

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, Oshawa
- ∇ St. Catharines Engine/Welland Avenue Plants, St. Catharines
- ∇ London Diesel, London
- ∇ National Parts Distribution Centre, Woodstock
- ∇ Windsor Transmission Plant, Windsor
- ∇ St. Therese Assembly Plant, Boisbien, Quebec

IV. CASE STUDIES

The case study format in this report has been substantially altered. The format has been enhanced so that the pollution prevention project description, the substance targeted, the objective and the results are easy to find.

Also, the case studies reported herein are examples of the types of activities underway in

each of the facilities and are by no means a full account for all of the pollution prevention activities completed, or underway within the companies. The companies continue to use the pollution prevention approach is based on the principles of total quality environmental management and continuous improvement. It is a step-by-step team approach that engages internal company representatives and in many cases, external resources, who work together at the earliest stages of a project to collect data, identify possible options to reduce or eliminate the targeted substance or material or processes. In some cases, the external resources are part of the implementation team.

The annual reduction of substances in use for this reporting period and to-date are provided in Table 2. It is important to recognize that the reductions reported only account for the reductions in the reported in the case studies. It is only partial account of the total reduction or elimination of substances that have taken place as a result of this voluntary pollution prevention project.

The companies have used the new reporting format by the Task Force for reporting 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 identify the company, the project description, the objective, the targeted reduction and the results and advantages including any cost savings. This is followed by a description the barriers encountered, the capital cost investment if available, when was completed, a description of the facility as well as its environmental programs.

The sixth report contains 24 new case studies, eight from each of the three companies. Table 3 summarizes these pollution prevention case studies which details the substance, the project, the media addressed and the results achieved. More detailed information on each of these case studies is provided in Appendix V.

Table 2. Reductions Achieved in New Case Studies by Substance and Cumulative Reductions from 1992-1997.

Substance	1992-1997 Reductions (tonnes/year)	1998/1999 Reductions (tonnes/year)
<u>Halogenated Hydrocarbons</u>		
Dichlorobenzene	0.27	
Methylene chloride	201.01	
PCBs	63.82	5.30
Total	265.10	5.30
<u>Non-halogenated Hydrocarbons</u>		
Benzene	0.02	
Ethylbenzene	0.03	8.00
Phenol	3.90	
Toluene	240.60	28.70
Total	244.55	36.70
<u>Metals</u>		
Antimony	0.03	
Arsenic	0.85	
Beryllium	0.28	
Cadmium		0.005
Chromium	26.55	40.56
Copper	98.28	1.00
Lead	198.13	27.60
Manganese		1.68
Mercury		0.001
Nickel	1.39	
Zinc	107.47	
Total	433.25	70.85

Substance	1992-1997 Reductions (tonnes/year)	1998/1999 Reductions (tonnes/year)
Other substances		
Acetone	58.00	54.00
Aluminum	788.90	69.00
butyl benzyl phthalate		20.00
De-emulsifier		212.35
Ethanol	10.00	
CFCs	1.18	
calcium chloride		220.00
Chlorine	1.4	
cutting oils	10.20	
ferric chloride		134.30
Hydrochloric acid	371.70	43.00
isobutyl alcohol		28.00
Isopropyl alcohol	43.3	
Methanol	23.0	
Methylenebis(phenylisocyanate)	76.8	
methyl ethyl ketone	122.0	
methyl isobutyl ketone	25.0	12.60
Naphthalene		0.86
nitric acid		10.00
n-butyl alcohol	10.70	29.60
oily water	22.70	1206.00
oil & grease		69.70
Lime	10.90	198.57
Paint	122.10	
paint sludge	682.27	

Substance	1992-1997 Reductions (tonnes/year)	1998/1999 Reductions (tonnes/year)
PCB waste	870.0	84.60
Phosphorus	1.00	
salt flux	10224.60	
sodium hydroxide	281.50	1141.00
sodium nitrate		100.00
Sodium meta bisulphate		3.40
Sodium hypochlorite		37.40
Sulphuric acid		749.51
1,2,4 trimethyl benzene		2.70
Industrial solid waste	308020.55	6907.34
Styrene	1500.0	
1,1,1-trichloroethane	14.1	
Xylene	494.60	160.5
VOCs	3648.19	1016.50
Hazardous waste	1432.41	
WTP sludge	4300.8	
Total	332373.47	12170.93
Grand total	333110.84	12623.78

TABLE 3. SUMMARY OF SELECTED NEW POLLUTION PREVENTION CASE STUDIES

Company	P2 Project	Targeted Reduction(s)	Targeted Substance(s)	Results/Advantages	Media Addressed
DaimlerChrysler (p. 47)	Elimination of Butyl Benzyl Phthalate in Plastisol Sealer	100% elimination	Butyl benzyl phthalate	<ul style="list-style-type: none"> · Eliminated over 20 tonnes/year of butyl benzyl phthalate · Over 5 tonnes eliminated from landfill 	<ul style="list-style-type: none"> · Land
Ford (p. 49)	Conversion to Non-Chrome Passivation	100% elimination	Chromium VI	<ul style="list-style-type: none"> · 100% elimination of chrome · Health and safety concerns eliminated · 40 tonnes/year chrome eliminated · 2.6 tonnes/year sulphuric acid reduced · 3.4 tonnes/ year sodium meta bisulphite reduced · Water usage reduced by 1.2 million litres · Cost savings of \$3,060 per year 	<ul style="list-style-type: none"> · Water
General Motors (p. 51)	Reduction in Use of Paint Purge	50+% reduction	Acetone, xylene, toluene and other solvent mixtures	<ul style="list-style-type: none"> · 540 tonnes of VOCs 	<ul style="list-style-type: none"> · Air · Land
DaimlerChrysler (p. 53)	Reformulation of Diamond Clearcoat Paint	100% elimination	Acetone, isobutyl-alcohol, n-butyl alcohol, toluene, xylene	<ul style="list-style-type: none"> · Reductions of - 54 tonnes acetone per year - 28 tonnes isobutyl alcohol per year - 28 tonnes of n-butyl alcohol per year - 108 tonnes of xylene per year · Higher quality paint finish 	<ul style="list-style-type: none"> · Air

TABLE 3. SUMMARY OF SELECTED NEW POLLUTION PREVENTION CASE STUDIES

Company	P2 Project	Targeted Reduction(s)	Targeted Substance(s)	Results/Advantages	Media Addressed
Ford (p. 55)	ClearCoat – Tutone Purge Deletion	5% elimination	1,2,4-trimethylbenzene, ethylbenzene, methyl isobutyl ketone, n-butanol, toluene, xylene	<ul style="list-style-type: none"> · Eliminated per year: - 52.5 tonnes xylene - 12.6 tonnes MIBK - 8.0 tonnes ethylbenzene - 2.7 tonnes 1,2,4-trimethylbenzene - 1.6 tonnes n-butanol - 0.7 tonne toluene · Material cost savings \$24,200: 	<ul style="list-style-type: none"> · Air · Land · Hazardous waste
General Motors (p. 57)	Elimination of Naphthalene	100%	Naphthalene	<ul style="list-style-type: none"> · Increased plant health and safety · Spill reduction potential · Use of naphthalene reduced by 0.86 tonne 	<ul style="list-style-type: none"> · Air
DaimlerChrysler (p. 59)	Fluorescent Tube Recycling	100%	Mercury	<ul style="list-style-type: none"> · Over 31,000 linear feet of fluorescent tubes were eliminated from landfill · 0.25 kg recovered · 1.0 tonne of waste tubes 	<ul style="list-style-type: none"> · Land · Water
Ford (p. 61)	Installation of Washer Solution Recovery System	100%	Washer solution including oil/greases, aluminum, cadmium and copper	<ul style="list-style-type: none"> · Recovery on an annual basis of: - 69.7 tonnes of oil/greases - 69 tonnes of aluminum - 22 kg of copper - 5 kg of cadmium · 145.2 tonnes of washer fluid eliminated from disposal · Cost savings of \$30,500 · Solution can be reused 	<ul style="list-style-type: none"> · Hazardous waste · Land

TABLE 3. SUMMARY OF SELECTED NEW POLLUTION PREVENTION CASE STUDIES

Company	P2 Project	Targeted Reduction(s)	Targeted Substance(s)	Results/Advantages	Media Addressed
General Motors (p. 63)	PCB Transformer Replacement	100% elimination	PCBs (high level)	<ul style="list-style-type: none"> · In-service PCB transformers eliminated · Elimination of 5.3 tonnes by weight PCBs · Cost saving 	<ul style="list-style-type: none"> · Air · Water · Land · Groundwater
DaimlerChrysler (p. 65)	Introduction of Lead-Free Electrocoat Primer Paint	100% elimination	Lead	<ul style="list-style-type: none"> · Over 25 tonnes of lead was eliminated · 2.6 tonnes of lead in sludges and filters eliminated from hazardous landfills 	<ul style="list-style-type: none"> · Land · Water
Ford (p. 67)	Reduction in Paint Use and VOC Emissions	7% decrease in paint usage and VOC emissions	VOCs including ethylbenzene and toluene	<ul style="list-style-type: none"> · Over 100 tonnes of VOC reduced · Reduction in paint usage · Cost savings of \$4.5 per unit bulk material · 	<ul style="list-style-type: none"> · Air
General Motors (p. 69)	Metabells to Reduce Paint Usage	Not known	n-butyl acetate, xylene, alcohols, naphthas, toluene	<ul style="list-style-type: none"> · 18 tonnes of VOCs reduced · Savings of \$675 K · Increased paint transfer efficiency · Reduction in pain overspray 	<ul style="list-style-type: none"> · Air
Daimler Chrysler (p. 71)	VOC Reductions by Paintshop Modifications	10% reduction	VOCs in painting operations	<ul style="list-style-type: none"> · 34.8 tonnes of VOCs reduced · Savings of \$ 1.8 million 	<ul style="list-style-type: none"> · Air

TABLE 3. SUMMARY OF SELECTED NEW POLLUTION PREVENTION CASE STUDIES

Company	P2 Project	Targeted Reduction(s)	Targeted Substance(s)	Results/Advantages	Media Addressed
Ford (p. 73)	PCB Phase-Out	100% removal and disposal	PCBs	<ul style="list-style-type: none"> · 60% of PCB-containing items removed and disposed · All PCB material in storage has been removed and shipped for disposal · 41.8 tonnes transformer cases · 19.5 tonnes low level PCB liquid · 9.2 tonnes askarel liquid · 5.0 tonnes PCB debris · 4.8 tonnes ballasts · 4.3 tonnes capacitors 	<ul style="list-style-type: none"> · Hazardous Waste · Land
General Motors (p. 75)	Reduction in Fugitive Emissions During Bulk Filling for Gasoline and Windshield Washer Fluid	90+% reductions in fugitive emissions	Gasoline, methanol	<ul style="list-style-type: none"> · 3.1 tonne/year gasoline vapour eliminated · 0.6 tonne of windshield washer fluid · Reduce risk associated with explosion due to fugitive emissions 	<ul style="list-style-type: none"> · Air
DaimlerChrysler (p. 77)	VOC Reductions from Painting Processes	Napthas, VOCs	50% reduction of total VOCs	<ul style="list-style-type: none"> · 320 tonnes of VOCs eliminated · Total emissions reduced by 50% · Improved painting efficiencies and practices · Reduction in odor events 	<ul style="list-style-type: none"> · Air
Ford (p. 79)	Swarf Diversion Project	Copper, chromium, manganese	100% recycling	<ul style="list-style-type: none"> · ~280 tonnes of waste containing metals were diverted from landfill and recycled - 1.68 tonnes of manganese - 0.98 tonne of copper - 0.56 tonne of chromium 	<ul style="list-style-type: none"> · Land

TABLE 3. SUMMARY OF SELECTED NEW POLLUTION PREVENTION CASE STUDIES

Company	P2 Project	Targeted Reduction(s)	Targeted Substance(s)	Results/Advantages	Media Addressed
General Motors (p. 81)	Recycling from Re-Lamping Project	100% recycle	Fluorescent lamps, ballasts and fixtures	<ul style="list-style-type: none"> · 31.6 tonnes non-PCB lighting ballasts recycled · 411,307 linear feet of fluorescent lamps recycled and some reused · \$1.8 million in electrical energy savings 	<ul style="list-style-type: none"> · Potential Land and Air Emissions
DaimlerChrysler (p. 83)	Elimination of Hydrochloric Acid in Water Deionization	100%	Hydrochloric acid	<ul style="list-style-type: none"> · 43 tonnes/year hydrochloric acid eliminated · Improved maintenance of sewer lines · Eliminated hazardous waste handling · Potential spills reduction 	<ul style="list-style-type: none"> · Water
Ford (p. 85)	Oily Waste Treatment Plant Upgrade	100% elimination	Sulfuric acid, sodium hydroxide, calcium chloride, phenol, oil/greases	<ul style="list-style-type: none"> · 740 tonnes/year sodium hydroxide eliminated · 220 tonnes/year calcium chloride eliminated · 450 tonnes/year hydrochloric acid eliminated · Chemical cost savings of \$280,000 · Increased efficiency of oil and water separation · Phenol concentration reduced from 2400 ug/L to 138 ug/L 	<ul style="list-style-type: none"> · Water
General Motors (p. 87)	Replace Electrochemical Deburr with Cascade Deburr	100% sodium nitrate, nitric acid, sodium hydroxide & 90% waste sludge	Sodium nitrate, nitric acid, sodium hydroxide, waste sludge	<ul style="list-style-type: none"> · Eliminated: <ul style="list-style-type: none"> - 100 tonnes/year sodium nitrate - 10 tonnes/year nitric acid - 180 tonnes/year sodium hydroxide - 1,000 tonnes/year waste sludge 	<ul style="list-style-type: none"> · Potential Land and Water Emissions

TABLE 3. SUMMARY OF SELECTED NEW POLLUTION PREVENTION CASE STUDIES

Company	P2 Project	Targeted Reduction(s)	Targeted Substance(s)	Results/Advantages	Media Addressed
DaimlerChrysler (p. 89)	Disposable Packaging Conversion to Returnable Containers	95% elimination	Cardboard, wooden pallets, scrap wood	<ul style="list-style-type: none"> · Over 4,350 tonnes/year cardboard, pallets and scarp wood eliminated · Savings of \$9.8 million · Increased quality due to improved housekeeping 	<ul style="list-style-type: none"> · Land
Ford (p. 91)	Water Diversion	30% water reduction 20% chemical use reduction	Water consumption, sodium hydroxide, ferric chloride, sulphuric acid, sludge	<ul style="list-style-type: none"> · 480 million litres water savings · Eliminated per year: <ul style="list-style-type: none"> - 146.7 tonnes sodium hydroxide - 134.3 tonnes ferric chlorid - 19.4 tonnes sulphuric acid - 449 tonnes sludge · Energy savings of \$4,800 · Savings of \$216,000 due to wastewater reductions 	<ul style="list-style-type: none"> · Water
General Motors (p. 93)	Direct Disposal of Oily Floc	100%	Sulphuric acid, lime, sodium hypochlorite, rag and filter cake streams	<ul style="list-style-type: none"> · Elimination or reduction of: <ul style="list-style-type: none"> - 212 tonnes de-emulsifier - 277 tonnes sulphuric acid - 37 tonnes sodium hypochlorite - 199 tonnes lime - 74 tonnes caustic - 800 tonnes filter cake disposal - 1206 tonnes rag - 1,500 million BTU steam 	<ul style="list-style-type: none"> · Potential Land and Water Emissions

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. A one day pollution prevention technology transfer workshop is scheduled for November 30, 1999 to share information about the project with suppliers and to encourage them to undertake pollution prevention activities and implement environmental management systems within their own facilities.

In addition, the companies individually have been promoting pollution prevention, the use of environmental management systems and best environmental practices with their respective suppliers through their internal communications systems and supplier councils.

VI. ONGOING COMMUNICATIONS

The task force members have been proactive in sharing information on the project and its progress by making presentations to a variety of groups. These include public interest groups, labour groups, and other interested parties with the intent to foster ongoing dialogue on the project and solicit input to the project.

In March 1999, the DaimlerChrysler Bramalea Assembly Plant and the Project task force hosted a Multi-stakeholder Consultative Meeting of the Commission on Sustainable Development (UNEP) on the Key Elements of Voluntary Initiatives. A presentation on the CVMA project, including the criteria and principles of voluntary agreements, a presentation on the plant's environmental programs and its associated successes and a plant tour pointing out pollution prevention initiatives was provided to representatives of governments, industry, trade organizations, labour groups and non-governmental organizations (NGOs) from around the world

In the 1998 MOU renewal, the task force indicated that it would enhance communications with the public and interested stakeholders by conducting site visits at facilities that are participating in the project. Such visits provide additional opportunities for discussion and input to the project. The first site visit and presentation was held on June 24, 1999 at the General Motors Truck Plant in Oshawa. Presentations by plant personnel were delivered on pollution prevention projects, followed by a tour of the site where the project activities were highlighted. NGO comments were generally favourable and suggested that the site visit served to provide a better understanding of the projects and successes.

Participants included representatives from the Ontario Environmental Commissioner's Office; the International Joint Commission; Nancy Diamond, Mayor of Oshawa; Industry Canada; the Recycling Council of Ontario; Canadian Centre for Pollution Prevention; Trent University; York University Faculty of Environmental Studies; Friends of the Second Marsh; Canadian Auto Workers; Pollution Probe; Toronto Environmental Alliance and the Department of Defense. The next site visit and presentation will be held at Ford.

Throughout the period, presentations on the project were also made to many groups including, but not limited to the following:

- 1998 Environmental Issues Workshop, February 1998
- Confederation of Indian Industrial Environmental Delegation, Toronto, March 1998
- Canadian Pollution Prevention Roundtable, Winnipeg, Manitoba, May 1998
- Toronto Environmental Tradeshow & Conference, Toronto, May 1998
- Canadian Petroleum Products Institute Pollution Prevention Workshop, Toronto, May 1998
- Great Lakes Regional Pollution Prevention Roundtable, Buffalo, NY, August 1998
- York University Faculty of Environmental Studies, Toronto, October 1998
- Michigan Department of Environmental Quality and AAMA Waste Reduction 1998 Workshop, Livonia, Michigan, November 1998
- Chinese Information Technology Study Tour Delegation, Toronto, December 1998
- Great Lakes Regional Pollution Prevention Roundtable, Chicago, IL, March 1999
- Canadian Pollution Prevention Roundtable, Vancouver, BC, April 1999
- APMA Annual Conference, Hamilton, April 1999
- US National Pollution Prevention Roundtable, Washington, DC, April 1999
- MOE Environmental Management System Training Course, May 1999
- Meeting on Ecologically Sustainable Development, Swedish Delegation, September 1999

The CVMA task force has been actively working to increase the profile of the CVMA P2 Project information on Environment Canada's Green Lane Internet site.

The MOU renewal was placed on the internet before being signed on November 3, 1998. The public consultations on the renewal conditions were seen as a means to enhance public input and consultation on the project. Any member of the public in this case was afforded the opportunity to comment for a thirty-day time period.

The task force is also in the process of developing a brochure on the project to assist with profiling the efforts by the three automotive companies. The project progress reports can be found on the Internet. These can be found by visiting the Ontario GreenLane at www.cciw.ca/green-lane/laws.html and the Toxics Prevention Division homepage at <http://www.cciw.ca/green-lane/epb/toxics/intro.html>.

The task force also continues to highlight the project through various publications. An article on the CVMA P2 Project entitled "Pollution pulls over" was published in the "Let's Talk Green", the national newsmagazine of Environment Canada, in the November/December 1998 issue.

VII. CANADIAN – U.S. PROJECT COORDINATION

The U.S. and Canadian Auto Projects have been coordinating their efforts since mid-1992. The two task forces held their last meeting on November 5, 1999 in Livonia, Michigan. Information was shared on the status of the two projects and the need to communicate continue to report on the pollution prevention efforts on both sides of the border. Due to changes to the Automobile Manufacturers' Association in the U.S., the U.S. Project came to an end.

The U.S. companies have since continued their efforts on pollution prevention and have reported their progress to the Michigan Department of Environmental Quality.

More recently, on September 23, 1999, Daimler Chrysler, Ford Motor Company and General Motors Corporation announced a renewed commitment to pollution prevention through partnership with the Michigan Department of Environmental Quality. The Michigan Auto Project is a successor to the U.S. Auto Project, which concluded in 1998. The focus of the new Project will be on reducing pollution during vehicle manufacture and assembly.

The Michigan Auto Project partners, the DEQ, DaimlerChrysler, Ford and General Motors, have endorsed the project agreement which has been developed to continue their commitment to pollution prevention. The agreement calls for an annual progress report and a mechanism to engage stakeholders to help accomplish the project's objectives. Further information on the Michigan Auto Project can be found at: www.deq.state.mi.us/ead/p2sect/auto/.

Over the course of the next year, steps will be taken to coordinate efforts between the Canadian and Michigan Auto Projects.

VIII. FUTURE DIRECTION

The governments, CVMA, DaimlerChrysler, Ford and General Motors are committed to pollution prevention, in the true sense, and will continue to report on their progress over the next few years. There is a renewed commitment to further improve the communication and outreach on the Project with interested parties and with suppliers. The regulatory landscape challenges will guide the future of the project in the new millennium.

APPENDICES

Appendix I – MOU Certificate

Appendix II – MOU Addendum

MEMORANDUM OF UNDERSTANDING ADDENDUM

The Canadian Automotive Manufacturing Pollution Prevention Project Task Force comprised of representatives from the Federal Department of Environment, the Ontario Ministry of the Environment and the participating members of the Canadian Vehicle Manufacturers' Association (Chrysler Canada Ltd., Ford Motor Company of Canada, Limited, and General Motors Canada Limited) will continue for a two-year renewable period to December 31, 2000.

The purpose, responsibilities, goals, milestones and accomplishments remain as outlined in the documents entitled "Terms of Reference for the Joint Industry and Federal and Provincial Governments Automotive Manufacturing Pollution Prevention Task Force" and the "CVMA Member Companies Implementation Plan" with the exception of the following modifications. The intent of these modifications is to elaborate on key activities of the task force for this extension period:

1. The task force will continue to report on the progress of the development and implementation of pollution prevention plans.
2. The task force will enhance the procedure for reporting and verifying the progress of facility pollution prevention plans.
3. 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.
4. 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 as at July 6, 1994 and Schedule 1 of the Canadian Environmental Protection Act (CEPA) 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.
5. 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.
6. 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.
7. 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.

ACCOMPLISHMENTS AND FUTURE GOALS OF THE TASK FORCE

The continued commitment by industry and the governments to this Project will be demonstrated by achieving the specific goals and milestones as set out by the Task Force for this renewal period.

Revise and update the task force communications plan – September 1997

Conduct inventory scans on the substances listed on Schedule 1 of the Canadian Environmental Protection Act as at January 1995 and CEPA PSL 1 Toxics – October 1997

Prepare annual progress reports on the continued progress on the development and implementation of pollution prevention plans – March 1998, March 1999, March 2000

Enhance procedure for reporting and verifying progress of facility pollution prevention plans – April 1998

As part of updated communications plan, report on the Project's continued progress with public and interested stakeholders through workshops and meetings - November 1998 and ongoing

Through the updated communications plan, organize site visits with interested parties on specific pollution prevention projects – June 1998 and ongoing

Organize and conduct workshops between CVMA, other automotive industry groups and other industries to discuss the success of the pollution prevention activities - November 1997 and ongoing

Submit annual progress reports to ARET and P4 so that reported reduction/elimination of the targeted substances are incorporated in the reports of these two programs – September 1997 and ongoing

Encourage use of environmental management systems and pollution prevention techniques internally within companies and with suppliers - May 1997 and ongoing

Actively participate in the development of a potential public advisory group for joint MOUs between Environment Canada and the Ontario Ministry of the Environment - November 1998 and ongoing

Appendix III

Initial Candidates for Reduction/Elimination, Canada-Ontario Substances,
and
CEPA Schedule 1 substances and CEPA PSL1 substances

Initial Candidates for Reduction/Elimination

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

Note:

⁺⁺ = ARET Substance

List of 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 ⁺⁺	benzo(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

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 was added to Schedule 1

Appendix IV

Inventory Results from 1993, 1995, 1997 and 1998/1999

Inventory Results from 1993, 1995, 1997 and 1998/1999

	Substance	CAS #	List Name	93 Scan	96 Scan	97 Scan	98/99 Scan
1	Dichlorobenzenes	N/A	65, COA	X	X	X	X
2	Ethylene dibromide	106-93-4	65				
3	Hexachlorobenzene	118-74-1	65, COA, CEPA Sch. 1				
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, CEPA Sch. 1	X	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	X	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, CEPA Sch. 1	X	X	X	X
16	Trichloroethylene	79-01-6	65, CEPA Sch. 1	X	X	X	X
17	Trichlorophenols	N/A	65				
18	Benzene	71-43-2	65, CEPA Sch. 1	X	X	X	X
19	2,4-Dinitrotoluene	121-14-2	65	X			
20	Ethylbenzene	100-41-4	65	X	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	X
24	butylbenzyl phthalate	85-68-7	65	X	X	X	X
25	di-n-butyl phthalate	84-74-2	65	X	X		X
26	diethyl hexyl phthalate [Bis(2-ethylhexyl) phthalate]	117-81-7	65, CEPA Sch. 1	X	X	X	X

Note:

65 = substances in the initial of target substances

COA = substances covered under the Canada-Ontario Agreement

CEPA Sch. 1 = substances covered under CEPA Schedule 1

PSL1 Toxic = substances covered under PSL1 Toxic Substances

Inventory Results from 1993, 1995, 1997 and 1998/1999

	Substance	CAS #	List Name	93 Scan	96 Scan	97 Scan	98/99 Scan
27	diethyl phthalate	84-66-22	65	X	X		
28	dimethyl phthalate	131-11-3	65		X	X	X
29	acenaphtalene	N/A	65				
30	acenaphthene	83-32-9	65				
31	anthracene	120-2-7	65, COA				
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				
38	naphthalene	91-20-3	65	X	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	X
43	Antimony	7440-36-0	65	X	X	X	X
44	Arsenic	7440-38-2	65, CEPA Sch. 1*	X	X	X	X
45	Beryllium	7440-41-7	65	X	X	X	X
46	Cadmium	7440-43-9	65, COA, CEPA Sch. 1*	X	X	X	X
47	Chromium	7440-47-3	65, CEPA Sch. 1*	X	X	X	X
48	Copper	7440-50-8	65	X	X	X	X
49	Lead	7439-92-1	65, COA, CEPA Sch. 1	X	X	X	X
50	Mercury	7439-97-6	65, COA, CEPA Sch. 1	X	X	X	X
51	Nickel	7440-02-0	65, CEPA Sch. 1*	X	X	X	X
52	Selenium	7882-49-2	65	X	X	X	X

Note:

65 = substances in the initial of target substances

COA = substances covered under the Canada-Ontario Agreement

CEPA Sch. 1 = substances covered under CEPA Schedule 1

PSL1 Toxic = substances covered under PSL1 Toxic Substances

Inventory Results from 1993, 1995, 1997 and 1998/1999

	Substance	CAS #	List Name	93 Scan	96 Scan	97 Scan	98/99 Scan
53	Silver	7440-49-2	65	X	X	X	X
54	Zinc	7440-66-6	65	X	X	X	X
55	Aldrin	309-00-2	65, COA				
56	Chlordane	57-74-9	65, COA				
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 [Dodecachloropentacyclo[5.3.0.02,6.03,9.04,8]decane]	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, CEPA Sch. 1				
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				
76	dibenzo(a,j)pyrene	189-55-9	COA				
77	Dinitropyrene	N/A	COA				
78	Fluoranthrene	206-44-0	COA				

Note:

65 = substances in the initial of target substances

COA = substances covered under the Canada-Ontario Agreement

CEPA Sch. 1 = substances covered under CEPA Schedule 1

PSL1 Toxic = substances covered under PSL1 Toxic Substances

Inventory Results from 1993, 1995, 1997 and 1998/1999

	Substance	CAS #	List Name	93 Scan	96 Scan	97 Scan	98/99 Scan
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	X
83	Polybrominated Biphenyls	N/A	CEPA Sch. 1				X
84	Polychlorinated Terphenyls	N/A	CEPA Sch. 1				
85	Vinyl chloride	75-01-4	CEPA Sch. 1				
86	Bromochlorodifluoromethane	353-59-3	CEPA Sch. 1			X	X
87	Bromotrifluoromethane	75-63-8	CEPA Sch. 1			X	X
88	Dibromotetrafluoroethane	124-73-2	CEPA Sch. 1				
89	Fuel containing toxic substances	N/A	CEPA Sch. 1				
90	Dibenzo-p-dioxin	262-12-4	CEPA Sch. 1				
91	Dibenzofuran	132-64-9	CEPA Sch. 1				
92	Polychlorinated dibenzo-p-dioxins	N/A	CEPA Sch. 1				
93	Polychlorinated dibenzofurans	N/A	CEPA Sch. 1				
94	Tetrachloromethane (Carbon tetrachloride)	56-23-5	CEPA Sch. 1				
95	1,1,1-trichloroethane (Methyl chloroform)	71-55-6	CEPA Sch. 1			X	X
96	Bromofluorocarbons	N/A	CEPA Sch. 1				
97	Hydrobromofluorocarbons	N/A	CEPA Sch. 1				
98	Methyl bromide	74-83-9	CEPA Sch. 1				
99	Chlorofluorocarbons	N/A	CEPA Sch. 1.			X	X
100	1,2-dichloroethane	107-06-02	CEPA Sch. 1			X	
101	Benzidine	92-87-5	CEPA Sch. 1				
102	Bis(chloromethyl)ether	542-88-1	CEPA Sch. 1				
103	Bischloromethyl methyl ether	107-30-2	CEPA Sch. 1				
104	Chlorinated paraffins	N/A	PSL 1 Tox.			X	X

Note:

65 = substances in the initial of target substances

COA = substances covered under the Canada-Ontario Agreement

CEPA Sch. 1 = substances covered under CEPA Schedule 1

PSL1 Toxic = substances covered under PSL1 Toxic Substances

Inventory Results from 1993, 1995, 1997 and 1998/1999

	Substance	CAS #	List Name	93 Scan	96 Scan	97 Scan	98/99 Scan
105	Chlorinated wastewater effluents	N/A	CEPA Sch. 1				
106	Creosote impregnated wastes	N/A	CEPA Sch. 1				
107	Dioxins	N/A	CEPA Sch. 1				
108	Effluents from pulp mills using bleaching	N/A	CEPA Sch. 1				
109	Furans	N/A	CEPA Sch. 1				
110	Inorganic Fluorides	N/A	CEPA Sch. 1			X	X
111	PAHs ⁽¹⁾	N/A	CEPA Sch. 1, COA				
112	Refractory Ceramic Fibres	N/A	CEPA Sch. 1			X	X

Note:

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

Note:

65 = substances in the initial of target substances

COA = substances covered under the Canada-Ontario Agreement

CEPA Sch. 1 = substances covered under CEPA Schedule 1

PSL1 Toxic = substances covered under PSL1 Toxic Substances

Appendix V

Selected Company Pollution Prevention Case Studies

ELIMINATION OF BUTYL BENZYL PHTHALATE IN PLASTISOL SEALER

DAIMLERCHRYSLER CANADA INC.

PILLETTE ROAD TRUCK ASSEMBLY PLANT

Project Description:

The Pillette Road Truck Assembly Plant cross-functional Pollution Prevention Team targeted butyl benzyl phthalate as one of a number of substances for reduction or elimination. Butyl benzyl phthalate is one of the chemicals on the CVMA list of substances for pollution prevention and it was also a reportable substance on the National Pollutant Release Inventory (NPRI) list. Virtually all the usage of butyl benzyl phthalate at the plant was its inclusion in the composition of one product; pumpable plastisol sealer used for sealing the metal joints in the van bodies. The Team worked with the supplier of this product to reformulate it to not include butyl benzyl phthalate. The supplier was successful in reformulating the plastisol sealer to eliminate the substance completely. This eliminated the usage of over 20 tonnes of pure butyl benzyl phthalate per year and over 5 tonnes of the chemical going to landfill annually. It also eliminated reporting of a substance to the NPRI.

Objective:

To work with the supplier to reformulate the pumpable plastisol sealer and eliminate the use of butyl benzyl phthalate in the plant.

Substance(s) Targeted:

Butyl benzyl phthalate

Targeted Reductions:

100% elimination

Results and Advantages:

The usage of over 20 tonnes of butyl benzyl phthalate per year was eliminated and it is no longer a reportable NPRI chemical. Also over 5 tonnes of this material was eliminated from landfills.

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Material Substitution

Media Addressed:

Land

Capital Investment:

Nil

Barriers Encountered:

None

When was the project completed:

Start of 1998 model year

Description of Facility :

The Pillette Road Assembly Plant in Windsor, Ontario, manufactures 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.

Description of the Environmental and Energy Programs:

The facility is a waste reduction leader. It has won the Essex County Waste Management Award of Merit 3 years in a row for waste diversion. The recycle practices include cardboard, pallets, scrap wood, plastics, fine 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.

CONVERSION TO NON-CHROME PASSIVATION

FORD MOTOR COMPANY OF CANADA, LIMITED

OAKVILLE ASSEMBLY PLANT

Project Description:

Before paint can be applied to the vehicles, the bodies must be cleaned, phosphated (phosphate coating applied) and passivated to ensure corrosion resistance and strong paint adhesion. Passivation involves filling pores in the phosphate coating and has traditionally used a chrome containing solution. Non-chrome alternatives developed in the 1970s and 1980s either lacked the required performance or were cost prohibitive. Recently, Ford suppliers led development of new materials with equal or better performance than the chrome containing products. Trials conducted at Palmella, Portugal and the Kentucky Truck Plant confirmed the success of the new materials.

The conversion from Parcolene 60A to Parcolene 90A was a corporate driven mandate between multiple vendors and the Ford Motor Company. The main goal was to eliminate the use of chrome based post-treatment rinses, which have serious health and safety issues. The product conversion was completed during the summer shutdown of 1998. During that time, the existing chrome bath (Parcolene 60A) was drained to waste treatment via a dedicated chrome line. The tank was then chemically cleansed and rinsed to remove all remaining traces of the chrome product bath. A new bath was then prepared where Parcolene 90A was diluted with deionized water to a concentration of 0.5-1%.

Consequently, OAP is now using a less toxic and more environmentally friendly material called Parcolene 90A. In addition, OAP benefited by using less chemicals in wastewater and eliminating their emissions of chromium in wastewater.

Objective:

To eliminate chrome based technology in the post-treatment rinse product and convert to a new non-chrome product

Substance(s) Targeted:

Chromium VI

Targeted Reduction(s):

100% elimination

Results and Advantages:

- 100% elimination of chrome
- Health and safety concerns eliminated
- Bath-life extension with proper bath maintenance and adjustments
- 40 tonnes of chrome eliminated per year
- Annual savings of over 1.2 million litres of water due to new baths with circular current rinsing

- 2.6 tonnes of sulfuric acid and 3.4 tonnes of sodium meta bisulfite are not required each year to treat wastewater containing chrome
- Cost savings of \$3,060/year: Elimination of chemical treatment of chromium discharge
- Expected cost savings to occur from elimination of bath rebuilding

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Product conversion

Environmental Media Addressed:

Water

Capital Investment:

Cost of new phosphate system: \$22 million US dollars

Barriers Encountered:

None to report

When was the project completed or expected to be completed:

July 1998

Description of Facility:

The Oakville Assembly Plant manufactures 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 of Canada and the Ontario Truck Plant. The facility has 3.8 million square feet of floor area and employs approximately 3,200 people. The plant produces 75 units per hour, on two shifts, for a total of 1,200 units per day and approximately 288,000 per year. The first production began at the facility in 1953.

Description of the Environment and Energy Programs:

Existing environmental programs at the facility include Volatile Organic Compounds (VOC) reduction, PCB elimination, waste minimization, and a wildlife enhancement program. In 1997, an energy management system was installed to enable major electrical users to monitor their efficiency and production performance.

REDUCTION IN USE OF PAINT PURGE

GENERAL MOTORS OF CANADA LIMITED

OSHAWA AUTOPLEX – TRUCK ASSEMBLY CENTRE

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.

Chemical Managers were introduced to assist in the more efficient use of chemicals throughout Autoplex and reduce the cost per vehicle of chemical requirements. They work with environmental and process engineers to minimize the usage of individual chemicals and the variety of chemicals on site. The Chemical Management supplier provides all the chemistry required for production and is paid on a per vehicle built basis.

This supply arrangement, which includes purge solvent, provided some incentive for the Chemical Manager to initiate material reductions because the chemical manager is paid on a per vehicle basis. 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 and an increased capture rate for the purge. These changes commenced in 1996 and have continued on through 1998.

Objective:

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

Substance(s) Targeted:

Paint purge which contains approx. 42.5% acetone, 32% xylene, 12.5% toluene, and a balance of miscellaneous solvent mixtures.

Targeted Reductions:

50%+ in acetone, xylene, toluene, and other solvent mixtures.

Results and Advantages:

During normal production, purge solvent usage has been reduced by over 2.0 litres/vehicle from 1995 to 1998. The current reduction will result in an estimated additional annual 540 tonnes reduction of the speciated VOCs, for a total of 740 tonnes. Speciated VOCs refer to the constituents shown under Targeted Reductions. A case study previously reported in the 5th Progress Report April 1998 reported the initial 200 tonnes of VOC reductions.

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Process Modification

Environmental Media Addressed:

Air and Land

Capital Investment:

Not available

Barriers:

Reducing the frequency of the purge increased the amount of solids in the captured purge. This made purge recycling challenging.

Description of Facility

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 plant builds the Chevrolet Lumina, Monte Carlo and Impala models, and the Buick Regal and Century models. 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.

Description of the Environmental and Energy Programs

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 m³ 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 wastewater 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.

REFORMULATION OF DIAMOND CLEARCOAT PAINT

DAIMLERCHRYSLER CANADA INC.

WINDSOR ASSEMBLY PLANT

Project Description:

The painting process at Windsor Assembly Plant begins with an initial water-based primer paint electrocoated over the phosphated galvanized body. After applying and baking the powder coat antichip surfacer primer on the electrocoated primer, the vehicle is spray painted with coloured water-borne basecoat paints. The final solvent borne diamond clearcoat paint is applied electrostatically to achieve very high transfer rates. A mixture of solvents flash off from this final operation creating volatile organic compound (VOC) emissions. In order to develop a superior etch resistant clear coat and to minimize the releases of National Pollutant Release Inventory (NPRI) substances the solvent package was reformulated by the paint supplier PPG to include less toxic substances such as ethanol. This new formulation substantially lowered the number of reportable NPRI substances and decreased the quantities of NPRI substances by 246 tonnes per year.

Objective:

To develop a superior etch resistant clearcoat paint and minimize the air releases of NPRI substances.

Substances Targeted:

Acetone, i-butyl alcohol, n-butyl alcohol, toluene, xylene

Target Reductions:

100% elimination of i-butyl alcohol and toluene

Results and Advantages:

A superior etch resistant paint coating resulted in a higher quality finish. The reformulation resulted in avoidance of air releases on an annual basis of NPRI substances as follows:

acetone	- 54 tonnes
i-butyl alcohol	- 28 tonnes
n-butyl alcohol	- 28 tonnes
toluene	- 28 tonnes
xylene	- 108 tonnes

The reductions in i-butyl alcohol took Windsor Assembly Plant from being the highest NPRI release in Canada in 1996 to completely off the list with no requirements to report on i-butyl and n-butyl alcohols. In addition, it eliminated the plant from the summary list for acetone, i-butyl alcohol n-butyl alcohol, toluene and xylene in the 1997 NPRI report.

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Material Substitution

Media Addressed:

Air

Capital Investment:

Nil

Barriers Encountered

Technological Advances

Project Completed:

1997

Description of Facility:

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 that welds, paints and assembles the popular minivans.

Description of the Environmental and Energy Programs:

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.

CLEARCOAT – TUTONE PURGE DELETION
FORD MOTOR COMPANY OF CANADA, LIMITED
ONTARIO TRUCK PLANT

Project Description:

One key target area to reduce waste at the Ontario Truck Plant (OTP) is the paint shop. In the past, the vehicle clearcoating process was arranged so that every time a tutone unit was processed through the clearcoat automation, the electrostatic spray equipment would purge. This procedure occurred because the program was devised to purge every time a gap, longer than a unit space, went through the zone. Since the bells would not spray a second pass tutone, the bells would process this as a job space, and would perform the purge cycle. This resulted in a purge rate that was inflated by 20 purges an hour and incurred high costs. An opportunity to reduce emissions and costs presented itself when it was proposed to eliminate the purge between tutone units.

As of September 1997, bells in the clearcoat automation do not perform a purge cycle when a tutone unit is processed through the booth. To achieve the current reworking it was necessary to re-design and upgrade equipment. This reduced the number of purges per hour by the number of tutone units passing through the zone. The high backflush bells that are required ensure proper cleaning of the bell cup, with fewer purge cycles, because they allow purge solvent to clean the back of the bell cup.

Objective:

To reduce the usage of purge solvent by re-designing and upgrading clearcoat bells in the electrostatic spray equipment to eliminate purging between tutone units.

Substance(s) Targeted:

Purge solvents including 1,2,4-trimethylbenzene, ethylbenzene, methyl isobutyl ketone (MIBK), n-butanol, toluene and xylene

Targeted Reduction(s):

5% reduction in purge solvents

Results and Advantages:

- Overall 105 tonnes of purge solvent containing the following substances were eliminated per year:
 - 52.5 tonnes of xylene
 - 12.6 tonnes of MIBK
 - 8.0 tonnes of ethylbenzene
 - 2.7 tonnes of 1,2,4-trimethylbenzene
 - 1.6 tonnes of n-butanol
 - 0.7 tonne of toluene
- Overall material cost savings of \$24,200

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Modification of system

Environmental Media Addressed:

Hazardous waste, Solid waste, Air emissions

Capital Investment:

\$65,000 US dollars

Barriers Encountered:

None

When was the project completed or expected to be completed:

September 1997

Description of Facility:

The Ontario Truck Plant, 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 3 million square feet truck plant employs approximately 1300 people. On one shift per day, over 500 Ford F-150 and F-250 pick-ups are assembled at a rate of 52 units per hour for a total of approximately 100,000 units per year.

Description of the Environmental and Energy Programs:

Environmental initiatives at OTP include a new \$400 million paint shop, PCB elimination and waste/water diversion projects. In addition, purge solvent recovery systems, and improved thermal oxidation units have been used to lower emissions and paint sludge waste.

ELIMINATION OF NAPHTHALENE
GENERAL MOTORS OF CANADA LIMITED
OSHAWA CAR PLANT

Project Description

Naphthalene was used as a paint booth stripper in one of the Car Plant paint shop to clean down the paint booths. The naphthalene-based product was relatively inexpensive, easy to use and very effective. However, as this was the only product in use in the Car Plant that contained naphthalene, it was targeted for substitution by the environmental staff under the CVMA P2 Project. They were able to locate another product through the Chemicals Management Team. A suitable alternative was found that does not contain naphthalene but has a base of furfuryl alcohol and other aromatic hydrocarbons. Testing had to be done to ensure that trace amounts if in contact with an actual vehicle surface would not cause cratering of the paint finish.

Substance(s) Targeted:

Naphthalene

Targeted Reductions:

100% of indirect material use of naphthalene from the Car Plant

Results and Advantages:

Increased plant health and safety, reduction in potential for a spill, decreased use of naphthalene by approximately 0.86 tonne at the car plant.

Objective:

To eliminate the use of naphthalene in the car plant paint shop

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Substitution

Environmental Media Addressed:

Airshed

Capital Investment:

None

Barriers:

None

Facility Description

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 and in 1999 the Chevrolet Monte Carlo and the Impala, together with the Buick Regal, and the Buick Century models. In total, the two Car Assembly plants employ approximately 6,100 people.

Description of the Environmental and Energy Programs

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 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 marshalling areas within the Autoplex. These drums are then prepared for shipment and are picked up for disposal.

Hazardous bulk solids such as Wastewater Treatment Sludge and Energy from Waste Flyash 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 popcans 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.

Energy

A comprehensive energy conservation program has been in place for many years and recently has included the installation of high efficiency lighting that has resulted in significant reductions in energy demand.

FLUORESCENT TUBE RECYCLING

DAIMLERCHRYSLER CANADA INC.

WINDSOR ASSEMBLY PLANT

Project Description:

Waste fluorescent tubes have been tested as a leachate toxic waste in Ontario. Therefore all waste fluorescent tubes were disposed of as a hazardous waste in a registered hazardous waste landfill. In order to eliminate the landfilling of fluorescent tubes, Windsor Assembly Plant (WAP) changed its procedure and is now sending all the waste tubes generated at the plant both through regular replacement and large re-lighting projects to a recycling company. They recycle over 98% of the tubes including the mercury found in the tubes. With this change, waste generation of over 31,000 linear feet of fluorescent tube disposed annually at hazardous waste landfills was avoided.

Objective:

To eliminate the landfilling of fluorescent tubes

Substance(s) Targeted:

Mercury

Targeted Reductions:

100% of mercury in this waste stream

Results and Advantages:

Over 31,000 linear feet of fluorescent tubes were eliminated from hazardous landfills. The amount of mercury recovered is 0.25 kilograms and one tonne of waste tubes.

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Recycling

Media Addressed:

Land, water

Capital Investment:

Nil

Barriers Encountered:

None

When was the project completed:

April 1998

Description of Facility:

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 that welds, paints and assembles the popular minivans.

Description of the Environmental and Energy Programs:

Windsor Assembly won the 1992 Ontario Waste Management Corporation Award for Outstanding Reductions of Hazardous Wastes. Extensive recycle programs are also in place. In 1997 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.

INSTALLATION OF WASHER SOLUTION RECOVERY SYSTEM

FORD MOTOR COMPANY OF CANADA, LIMITED

WINDSOR ALUMINUM PLANT

Project Description:

In effort to reduce the amount of hazardous waste being produced, in 1996 it was proposed that a washer solution recovery system be installed at the Windsor Aluminum Plant. In the past, Laidlaw Environmental Service was called in to pump out the washer solution when maintenance was performed on the washer. Normally, it would take the Laidlaw truck 3 hours to complete the job. When the solution was pumped into the Laidlaw truck, it became contaminated and deemed hazardous, thus subject to disposal. This practice posed two concerns: 1) it imposed unnecessary disposal, and 2) downtime. Therefore, the installation of a washer solution recovery system would avoid unnecessary waste disposal and decrease downtime.

Objective:

To eliminate disposal of washer solution by installing a washer solution recovery system

Substance(s) being targeted:

Washer solution including oils/greases, aluminum, cadmium and copper

Targeted Reduction(s):

100% recovery

Results and Advantages:

- Reduced the amount of washer solution 15 kg / net cleaned ton of aluminum
- Based on 1998 production, 145.2 tonnes of washer solution was eliminated from disposal
- Recovering 100% of the washer solution would avoid disposing:
 - 69.7 tonnes of oils / greases;
 - 69.0 tonnes of aluminum;
 - 22 kg of copper; and
 - 5 kg of cadmium per year
- Annual cost savings: \$30,500
- The solution can be pumped out immediately, minimizing downtime
- The solution is free of contamination and can be reused, eliminating unnecessary disposal cost

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Recovery of waste

Environmental Media Addressed:

Hazardous Waste, Land

Capital Investment:

Cost of machinery: \$75,740 Canadian

Barriers Encountered:

None

When was the project completed or expected to be completed:

September 1996

Description of Facility:

The Ford Motor Company Windsor Aluminum Plant opened in 1991. The plant produces aluminum automotive engine blocks using the Cosworth process, a new process for casting aluminum engine components. The Windsor Aluminum Plant is the sole supplier of this type of engine blocks and heads. There are approximately 250 hourly employees and 85 salaried employees at this 270,000 square foot site. In 1997, 11,900,000 pounds of aluminum was cast.

Description of the Environmental and Energy Programs:

Environmental programs at this facility include an ethylbenzene and naphthalene reduction program and the production of high efficiency motors to reduce energy consumption.

PCB TRANSFORMER REPLACEMENT

GENERAL MOTORS OF CANADA LIMITED

DIESEL DIVISION

Project Description:

Replacement of four in-service Askarel type transformers, (2 - 1500 kVA, 2 - 1000 kVA), located in two substations located on the roof of the main locomotive production building.

A capital project was approved in the spring of 1998 for the removal of the transformers followed by replacement with four air cooled, dry-type transformers during the July 1998 shut down period.

The decision was taken by the facility to eliminate the remaining PCB-based transformers to eliminate the possibility of an environmental incident arising from a leak of fluid. The selection of air cooled transformers was made on the basis of a corporate recommendation as part of a multi million dollar replacement project. The PCBs removed were sent for destruction and the transformer cleaned and the metal components recycled.

Objective:

To eliminate PCB type transformers from the facility through replacement with non-PCB type transformers.

Substance(s) Targeted:

High level Polychlorinated Biphenyls (PCBs)

Targeted Reductions:

100% elimination

Results and Advantages:

Total elimination of in-service PCB transformers, containing approximately 5.3 tonnes by weight of PCBs and the inherent risk associated with use of it. In addition, the replacement of PCB transformers will result in a cost saving through the reduction in monitoring and reporting requirements.

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Material Substitution

Media Addressed:

Air, Water, Land, Groundwater.

Capital Investment:

\$250,000

Barriers Encountered

None

When was the project completed or expected to be completed

January 1999

Description of Facility

Diesel Division is a world class manufacturer of diesel-electric railway locomotives and specialized light armoured vehicles for military use. Diesel Division, Locomotive and Defence operations, employs approximately 2500 persons at its' 1.15 million square foot facilities at London, Ontario.

Description of the Environmental and Energy Programs

Diesel Division's (DD) Environmental Services Department employs three full-time persons who, reporting directly to senior management, have the prime responsibility for managing environmental issues within DD for GM.

Diesel Division has over the years implemented comprehensive programs for source segregation and waste minimization. Formalized programs exist for recycling of paper, OCC, metal, wood, glass and aluminum cans. In affirmation of the success of those programs Diesel Division in 1997 diverted 5,957 metric tonnes of waste material from landfill, over 90% of the total solid waste stream.

Diesel Division operates a full time wastewater treatment system for the pretreatment of process wastewater prior to discharge to the municipal sanitary sewer system. The wastewater treatment plant, which employs two full-time stationary engineers, treated over ten million gallons of wastewater in 1997.

Diesel Division maintains an aggressive pollution prevention program, including daily environmental inspections and scheduled semi-annual analysis of all storm and wastewater outfalls. Diesel Division's Spill Prevention Control and Countermeasure Plan combined with formalized investigations and documented corrective actions is being used successfully to reduce the number of undesired environmental incidents, (spills), at the facility.

Diesel Division is committed to Environmental Loss Control.

INTRODUCTION OF LEAD-FREE ELECTROCOAT PRIMER PAINT

DAIMLERCHRYSLER CANADA INC.

WINDSOR ASSEMBLY PLANT

Project Description:

Historically the waterbased electrocoat primer paints contained quantities of lead for corrosion protection. With the launch of the new paint shop at Windsor Assembly Plant for the 1999 model year, the plant had the opportunity to switch to a new lead-free formulation.

This formulation meets all the requirements of corrosion protection for electrocoating priming without the use of lead. Lead is one of the metals on the CVMA pollution prevention list of substances, the National Pollutant Release Inventory (NPRI) list, and the Accelerated Reduction/Elimination of Toxics (ARET) list and the DaimlerChrysler list of restricted substances. A Life Cycle Assessment of the product showed that this could be eliminated without an overall increase in costs.

With this change in formulation over 25 tonnes of lead usage per year was eliminated and 2.6 tonnes of lead disposed annually at hazardous waste landfills was avoided. Also by eliminating the source of lead usage, the plant no longer has to report this substance to NPRI. Also this will assist DaimlerChrysler Canada in meeting its commitment to ARET to reduce the emissions of lead from its operations.

Objective:

To eliminate the use of lead in the waterbased electrocoat primer paint used to prime vehicles prior to applying the powder antichip primer and waterbased colour coats.

Substance(s) Targeted:

Lead in electrocoat primer paint formulations

Targeted Reductions:

100% elimination

Results and Advantages:

The usage of over 25 tonnes of lead was eliminated and it is no longer a reportable substance. Also 2.6 tonnes of lead in sludges and filters was eliminated from hazardous landfills.

In addition, health and safety concerns related to handling lead compounds was eliminated. Lead compounds were eliminated from the wastewater.

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Material Substitution

Media Addressed:

Land, water

Capital Investment:

Nil

Barriers Encountered:

Technology development

When was the project completed:

August 1998

Description of Facility:

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 that welds, paints and assembles the popular minivans.

Description of the Environmental and Energy Programs:

Windsor Assembly won the 1992 Ontario Waste Management Corporation Award for Outstanding Reductions of Hazardous Wastes. Extensive recycle programs are also in place. In 1997 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.

REDUCTION IN USE OF PAINT AND VOC EMISSIONS

FORD MOTOR COMPANY OF CANADA, LIMITED

ST. THOMAS ASSEMBLY PLANT

Project Description:

Paint usage is a key target area where the St. Thomas Assembly Plant (STAP) can address waste reduction while generating cost savings. Traditionally, the Paint Department applied all paint (prime, basecoat, and clear coat) using spray bells. However, the current style of bell cup exhibits limited transfer efficiency resulting in material loss. Therefore, to reduce paint usage and VOC emissions, higher efficiency bells will be installed over a two-year period beginning December 1998 to decrease paint consumption by 7%. This project was modeled after the success of its implementation experienced at the Ford Wixom Assembly Plant and the Ford Kentucky Truck Plant. When comparing the two systems, it was found that this automation system provided smoother appearance characteristics.

Objective:

Decrease paint usage and VOC emissions by purchasing and installing higher efficiency spray bells in all paint booths

Substance(s) Targeted:

Paint and VOCs including ethylbenzene and toluene

Targeted Reduction(s):

7% decrease in paint usage and VOC emissions

Results and Advantages:

Expected VOC reductions and paint savings based on results from Ford Wixom Assembly Plant:

- Greater than 100 tonnes per year VOC reduction. The amount of toluene and ethylbenzene cannot be accurately estimated on an ongoing basis because solvent packages differ by colour and the mix of colour applied is dynamic.
 - 64 tonnes less basecoat
 - 41 tonnes less clearcoat
 - 31 tonnes less paint primer
- Expected cost savings: \$4.50 per unit in bulk material

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Upgrade equipment

Environmental Media Addressed:

Air

Capital Investment:

\$1,152,000

Barriers Encountered:

None

When was the project completed or expected to be completed:

December 2000

Description of Facility:

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 61 units per hour, on two 8-hour shifts, for a total of 976 vehicles per day and approximately 200,000 per year. The production processes include stamping, body/welding, painting and assembly. Total employment stands at 2,504 hourly personnel supported by a salaried staff of 205.

Description of the Environmental and Energy Programs:

Existing environmental programs at the STAP include waste minimization, solid waste, drum, and solvent recycling and wastewater improvement. Approximately 98% of all solid non-hazardous waste generated is recycled at the facility. Due to these remarkable recycling efforts, in 1998 the St. Thomas Assembly Plant was the proud recipient of a Gold Award from the Recycling Council of Ontario for outstanding waste reduction, reuse, and recycling efforts.

METABELLS TO REDUCE PAINT USAGE

GENERAL MOTORS OF CANADA LIMITED

CAMI INGERSOL

Project Description:

In January 1998 CAMI AUTOMOTIVE INC. upgraded its topcoat painting operations. The previous basecoat application system consisted of a conventional reciprocating unit equipped with electrostatic, air atomized spray guns. CAMI was the first company in North America to install a new, state of the art, "Metabell" system.

The "Metabell" system is unique in that it utilizes high-speed rotary atomizing bells instead of conventional electrostatic spray guns to apply both layers of basecoat. In addition to the expected improvements in quality and material cost savings the bell application method resulted in significant environmental benefits.

The paint engineering and the environmental staff were involved in the final decision to adopt a new technology that was to significantly improve the transfer efficiency during paint application and hence reduce the amount of solvents released to the atmosphere during the painting process. The robots which are used have arm mounted colour changers that decrease the paint line length and thus colour change time which in turn reduces both paint losses and solvent emissions.

Objective:

To improve the quality of the paint finishes while reducing the amount of paint used and hence the release of residual VOCs

Substance(s) Targeted:

Automotive paint and its VOC components including n-butyl acetate, xylene, alcohols, naphthas, toluene and other petroleum distillates.

Targeted Reductions:

Not known

Results and Advantages:

The new 'Metabell' system yielded an increase of 24% in transfer efficiency plus a 56 % reduction in paint overspray for a net saving of over 0.300 litres per vehicle of paint. This amounts to a total yearly saving of 46,800 L of paint and a reduction of approximately 18 tonnes of VOC emissions of speciated solvents. The speciated solvents refers to constituents listed above under "substances targetted". The quality of the paint finish was improved.

The combined benefits of the new system produced a total paint related saving of greater than \$675,000 per year. Payback is expected to be less than five years.

Environmental Hierarchy:

Pollution Prevention

Prevention Approach:

Process Modification

Media Addressed:

Air Emissions

Capital Investment:

Not available

Barriers:

Not available

Facility Description:

CAMI Automotive, a joint venture (50% owned by GM of Canada / 50% owned by Suzuki), is a complete manufacturing and assembly facility covering 1.7 million square feet with a maximum capability of producing 200,000 units a year. CAMI employs over 2,400 staff and hourly employees. The processes performed at this facility include a sheet metal stamping shop, a body weld shop, a paint facility with bonderizing, priming and topcoat capabilities and a complete assembly shop.

Description of Environmental Programs

Waste Management Systems include a process sewer system directed to a water treatment system with pH control and metals removal capabilities. These effluents join a sanitary system directed to a municipal treatment plant. A dedicated storm sewer is protected by a storm retention pond surrounded by sampling wells.

CAMI has a dedicated solid waste management staff who process all hazardous and non-hazardous solid wastes. An extensive recycling program is utilized to minimize the need for disposal of wastes.

VOC REDUCTIONS BY PAINTSHOP MODIFICATIONS

DAIMLERCHRYSLER CANADA INC.

BRAMALEA ASSEMBLY PLANT

Project Description:

The Bramalea Assembly Plant established three cross-functional paint teams to improve painting efficiencies through process modifications in the paint shop as part of the plant's pollution prevention plan. The Paint Deletion Team optimized the use of various paints required in painting vehicles. Fluid delivery rates were reduced on interior surfaces and unnecessary robotic paths were deleted. In all, this team realized a savings of over \$4 per vehicle or \$1.3 million annually and reduced volatile organic compounds (VOCs) by 24,000 pounds per year.

The Block Painting Team's mandate was to reduce purgings between different colours by increasing the number of vehicles painted the same colour in a row. The purge rate was reduced by 20% through computer programming changes and optimizing conveyor systems. This resulted in savings of over \$500,000 and reduced purge usage by over 48,000 pounds.

The Solvent Management Team replaced a two-part solvent line cleaning package with a one part water based system. The VOC savings are 6.03 pound per gallon of cleaner used or 24,000 pounds per year and the VOC emission reductions are estimated at 4800 pounds.

Objective:

To reduce VOC emissions from the paint shop processes

Substance(s) Targeted:

VOCs in painting operations.

Targeted Reductions:

10% reduction in VOC emissions and paint wastes

Results and Advantages:

The three paint teams reduced VOC emissions by over 10% or 34.8 tonnes per annum and saved over \$1.8 million in reduced paint and solvent usage without using any capital costs.

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Process Change, Process modification, Material Substitution,

Media Addressed:

Air

Capital Investment:

None

Barriers Encountered:

None

When was the project completed:

July 1999

Description of Facility:

The Bramalea Assembly Plant in Brampton, Ontario manufacturers 1,377 cars per day on three shifts of the LH line - Chrysler Intrepid, Concorde, 300M and LHS. The production processes include stamping, body welding, painting and assembly.

For the 1998 and 1999 models the plant has 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 plant converted the colour coat base paints from high solids solvent borne enamels to waterborne paints.

Description of the Environmental and Energy Programs:

The facility has extensive waste management programs, including waste drum labeling, weekly internal audits, on-site waste treatment facility, spill teams, and environmental training sessions all handled by two Environmental Specialists. 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.

PCB PHASE-OUT

FORD MOTOR COMPANY OF CANADA, LIMITED

WINDSOR CASTING PLANT

Project Description:

During the construction of the Windsor Casting Plant, polychlorinated biphenyl's (PCBs) were commonly used in transformers, cabling, and light ballasts. Upon the discovery of the hazards associated with PCBs, a PCB phase-out program was initiated in 1997 to deactivate and store all PCB containing equipment in a specially designed storage facility and to monitor its condition.

As a part of the plant's continuous process improvement strategy, the project team's effort was centered on completing the removal of all remaining PCB capacitors, transformers, and ballasts from the storage area. These PCB articles have been shipped to a government approved facility in Swan Hills, Alberta to properly contain and destroy PCBs. All PCB equipment was replaced with non-PCB oil filled equipment. Plans exist to decommission PCB containing equipment presently in-service at WCP. Plans exist to decommission presently in-service PCB transformers by the end of 2005. These items will also be shipped for destruction and replaced with PCB-free equipment.

Objective:

To remove and dispose all PCB containing items

Substance(s) Targeted:

PCBs

Targeted Reduction(s):

100% removal and disposal

Results and Advantages:

- 60% of PCB-containing items removed and disposed
- As of April 28, 1998, all PCB material in storage has been removed and shipped for disposal
- To date the following PCB-containing items have been removed and properly disposed of:
 - 41.8 tonnes of transformer carcasses
 - 19.5 tonnes of low level liquid
 - 9.2 tonnes of askarel liquid
 - 5.0 tonnes of PCB debris
 - 4.8 tonnes of ballasts
 - 4.3 tonnes of capacitors

Environmental Hierarchy:

Disposal

Pollution Prevention Approach:

Elimination of hazardous waste, product substitution

Environmental Media Addressed:

Hazardous waste, Land

Capital Investment:

\$750,000

Barriers Encountered:

None

When was the project completed or expected to be completed:

April 1998

Description of Facility:

The Windsor Casting Plant is Ontario's largest iron foundry. Cylinder blocks, bearing caps and crankshafts are produced on the 500,000 square foot site. There are approximately 1,050 employees, both salaried and hourly, operating on two eight-hour production shifts. The plant, which began operations in 1934, shares a site with the Windsor Engine Plant.

Description of the Environmental and Energy Programs:

Environmental programs at this facility include particulate and odour reduction programs for air, phenol 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 material. Recently, the Windsor Casting Plant was awarded the 1998 Canadian Council of Ministers of the Environment Pollution Prevention Award for Large Businesses for their efforts in cyanide destruction through advanced ozonation and industrial wastewater.

REDUCTION OF FUGITIVE EMISSIONS DURING BULK FLUID FILLING FOR GASOLINE AND WINDSHIELD WASHER FLUID

GENERAL MOTORS OF CANADA LIMITED

OSHAWA CAR PLANT

Project Description:

The outside gasoline and windshield washer fluid tanks were modified by adding drop tubes to allow submerged filling and by adding combination conservation vents. The addition of the drop tubes permitted the gasoline and windshield washer fluids to be introduced below the liquid level in their respective tanks and hence reduce the turbulence and volatilization of the liquids, which in turn reduced the release of the vapours to the atmosphere. These changes were also accompanied by the introduction of a pressurized system in the receiving tank to force any vapour back into the truck from which the fuel was being pumped. This system assisted the vacuum system in the truck pumping system to minimize the release of vapours. The changes were made as part of an upgrade to the Car Plant tank farm.

Substance(s) Targeted:

Gasoline, methanol from windshield washer fluid

Targeted Reduction(s):

90+% reduction in fugitive emissions from splash filling from gasoline and windshield washer fluid during tank filling operations

Results and Advantages:

3.1 tonne of gasoline vapour eliminated each year

0.6 tonne of windshield washer fluid

By reducing the likelihood of elevated gasoline vapour levels in the tank, the risk associated with explosives of fugitive emissions was also reduced.

Objective:

To reduce fugitive emissions during tank filling of gasoline and windshield washer fluid

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Process improvement

Environmental Media Addressed:

Air

Capital Investment:

\$4,000

Barriers:

None

Description of Facility

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 and in 1999 the Chevrolet Monte Carlo and the Impala, together with the Buick Regal, and the Buick Century sedans. In total, the two Car Assembly plants employ approximately 6,100 people.

Description of the Environmental and Energy Programs

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 m³ 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 Wastewater 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 popcans 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.

Energy

A comprehensive energy conservation program has been in place for many years and recently has included the installation of high efficiency lighting that has resulted in significant reductions in energy demand.

VOC REDUCTIONS FROM PAINTING PROCESSES

DAIMLERCHRYSLER

PILLETTE ROAD TRUCK ASSEMBLY PLANT

Project Description:

The Pillette Road Truck Assembly Plant cross-functional VOC (volatile organic compounds) Reduction Team was challenged to reduce the total amount of VOC emissions coming from surface coating activities. The driving force were the 1995 Canadian Council of Ministers of the Environment (CCME) new source performance standards and surface coating guidelines for automotive painting operations. The final guideline limits for 2005 in the number of grams of total VOCs that can be emitted per square metre of light duty truck coated is 75. To meet these new guidelines, the plant embarked on a two year program to minimize the emissions through introducing pre-moistened naphtha wipes, improving purge capture, improving transfer efficiency and optimizing paint spray parameters.

The use of booth cleaning solvents was also reduced through education, training and use of equipment covers. The plant reduced paint shop emissions by 50% or 320 tonnes by the end of the two years and now readily meets the 2005 CCME compliance standard.

Objective:

To reduce total VOC emissions from the paint shop to meet the 2005 CCME guidelines for light duty trucks of 75 grams per metre coated.

Substance(s) Targeted:

Naphtha, VOCs

Targeted Reductions:

To reduce the total VOC emissions by 50% to meet the 2005 CCME standard.

Results and Advantages:

The usage of over 320 tonnes of VOC emissions were eliminated and total emissions reduced by 50%. The changes also improved painting efficiencies and practices. The reduced levels of emissions have also minimized chances of odor events.

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Process Change, Process modification, Education and Training

Media Addressed:

Air

Capital Investment:

None

Barriers Encountered:

None

When was the project completed:

September 1999

Description of Facility :

The Pillette Road Assembly Plant in Windsor, Ontario, manufactures 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 that welds, paints and assembles the vehicles.

Description of the Environmental and Energy Programs:

The facility is a waste reduction leader. It has won the Essex County Waste Management Award of Merit 3 years in a row for waste diversion. The recycle practices include cardboard, pallets, scrap wood, plastics, fine 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.

SWARF DIVERSION PROJECT
FORD MOTOR COMPANY OF CANADA, LIMITED
ESSEX ENGINE PLANT

Project Description:

As a part of Essex Engine Plant's continuous process improvement strategy, a program to decrease the amount of waste sent to landfill was developed. Grinding swarf, scrap tool steel and copper wire are collected by Zalev brothers at a cost of \$1 per ton. In exchange for the total scraps and swarf collected, the casting plants receive a quantity of alloy materials in equal value.

Grinding swarf continues to be collected in a lugger box provided by Zalev brothers for briquetting and subsequent sale. Other materials such as scrap tool steel and copper wire are also collected and in exchange, the casting plants receive a quantity of alloy materials in equal value.

Objective:

To recycle grinding swarf, scrap tool steel, and copper wire and reduce the amount of copper, chromium, and manganese that were once landfilled.

Substance(s) Targeted:

Copper, chromium, and manganese

Targeted Reduction(s):

100% recycling of grinding swarf, scrap tool steel and copper wire

Results and Advantages:

- In 1997, approximately 280 tonnes of waste containing the following metals were diverted from landfill and recycled at casting plants
 - 1.68 tonnes of manganese
 - 0.98 tonne of copper
 - 0.56 tonne of chromium
- Casting plants received a quantity of alloy materials in equal value to the total scrap tool steel, copper wire, and swarf shipped to Zalev brothers.

Environmental Hierarchy:

Recycling

Pollution Prevention Approach:

Material re-use

Environmental Media Addressed:

Land

Capital Investment:

Nil

Barriers Encountered:

Nil

When was the project completed or expected to be completed:

End of 1996

Description of Facility:

The Essex Engine Plant is located on a 1.7 million square foot site in Windsor, Ontario. The first production began in 1981. The plant manufactures 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 employs 1,400 full-time hourly and salary personnel and produced 571,000 units in 1997.

Description of the Environmental and Energy Programs:

Environmental programs at this facility include waste diversion projects and a reduction program which decreases the amount of oil used per engine. Several energy programs have been implemented to reduce energy consumption some of which include a light retrofitting project, implementation of a compressed air and hydraulic leak repair system, and the installation of a new state-of-the-art networked microprocessor based system to replace the air compressor controls.

RECYCLING FROM RE-LAMPING PROJECT

OSHAWA CAR PLANT

GENERAL MOTORS OF CANADA LIMITED

Project Description:

A relamping project was undertaken to improve the quality and energy efficiency of lighting in various areas of the car assembly plant. Metal halide lighting was installed in the high bay areas of the Car Plant. This lighting choice provided a better distribution of lighting across work surfaces with better colour rendition while achieving a 46% reduction in energy requirements. In conjunction with this project a replacement of old fluorescent systems with a newer model T8 fluorescent fixtures provided a 38% reduction in energy requirements. A byproduct of the re-lamping was large quantities of fluorescent lamps, light ballasts and old fixtures. All of these components were either recycled or reused. Those that were recycled were fitted with improved ballasts and lamps that last longer with less fade and result in reduced maintenance costs. Fixtures to be recycled were sent to a special recycler who separated the components as noted below for re-use or proper disposal.

Substance(s) Targeted:

Fluorescent lamps, ballasts and fixtures

Targeted Reductions:

100% recycle of the old lamps

Results and Advantages:

The car plant has recycled 31.56 tonnes of non-PCB lighting ballasts, 411,307 linear feet of fluorescent lamps and has reused numerous lighting fixtures in other GM site locations. The ballasts are processed by a contractor to reclaim the pitch, tar and metal. The pitch/tar mixture was processed at Swan Hill in Alberta as a precautionary measure, while the metal component was recycled. A contractor also broke down the lamps into metal, glass, mercury and phosphorous powder components, which were then recycled. Of the 12,000 fixtures replaced within this project, 9,000 were removed from the site as described above, 3,000 were reused within the Autoplex to replace less efficient lighting fixtures. Furthermore a continuing \$1.8 Million electrical energy saving is expected to be realized.

Objective:

To reduce waste sent to landfill during an extensive lighting retrofit

Environmental Hierarchy:

Recycling/Reuse

Pollution Prevention Approach:

Recycling/Reuse

Environmental Media Addressed:

Potential Land and Air Emissions

Capital Investment:

For the recycling portion of the project the only cost incurred was for the recycling of fluorescent lamps, all others were at no cost or small revenues. The new lighting project cost approximately \$4 Million.

Barriers:

None

Description of Facility

The Oshawa Autoplex is the largest North American Automotive facility, occupying a total of 12,216 thousand square feet of floor area. The Car and Truck Assembly plants build the Chevrolet Lumina, Monte Carlo and Impala models, the Buick Regal and Century models and Chevrolet and GMC C/K Pickup Trucks. Other operations include Stamping, Tri-Link, and Battery manufacturing. In total, the two Car Assembly plants employ approximately 6,100 people.

Description of the Environmental and Energy Programs

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 1.9 million imperial gallons 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 marshalling areas within the Autoplex. These drums are then prepared for shipment and are picked up for disposal.

Hazardous bulk solids such as Wastewater Treatment Sludge and Battery Plant Concrete/Soil 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 popcans for recycling.

Energy

A comprehensive energy conservation program has been in place for many years and recently has included the installation of high efficiency lighting that has resulted in significant reductions in energy demand.

ELIMINATION OF HYDROCHLORIC ACID IN WATER DEIONIZATION

DAIMLERCHRYSLER CANADA INC.

PILLETTE ROAD TRUCK ASSEMBLY PLANT

Project Description:

The phosphating of vehicles prior to painting requires large amounts of deionized water to clean the vehicles and eliminate any impurities which may cause paint failures in the field. Traditionally, deionized water has been produced onsite by ion exchangers that use large amounts of caustic and hydrochloric acid in treating municipal water. The waste hydrochloric acid corrodes the concrete sewer lines and the waste caustic congeals the electrocoat paint wastes in the sewer lines.

The plant switched water deionization technologies by going to reverse osmosis systems that utilizes membranes for water purification instead of chemicals as part of the plant's pollution prevention plan when additional capacity was required. This eliminated the concern of hydrochloric acid corroding the sewer lines and the waste paint being congealed by the waste caustic.

Objective:

To eliminate the use of hydrochloric acid in water softening

Substance(s) Targeted:

Hydrochloric Acid (30% HCl)

Targeted Reductions:

100%

Results and Advantages:

43 tonnes/year of hydrochloric acid (30% HCl) eliminated from use and it is no longer a reportable NPRI substance. The sewer lines are easier to maintain without the possibility of plugging by congealed electrocoat paint. The reverse osmosis system also eliminates the handling of hazardous chemicals and the possibility of spills.

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Technology Change, Process Modification

Media Addressed:

Water

Capital Investment:

\$350,000

Barriers Encountered:

Nil

When was the project completed:

1997

Description of Facility:

The Pillette Road Assembly Plant in Windsor, Ontario, manufactures 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.

Description of the Environmental and Energy Programs:

The facility is a waste reduction leader. It has won the Essex County Waste Management Award of Merit 3 years in a row for waste diversion. The recycle practices include cardboard, pallets, scrap wood, plastics, fine 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.

OILY WASTE TREATMENT PLANT UPGRADE
FORD MOTOR COMPANY OF CANADA, LIMITED
WINDSOR ENGINE PLANT

Project Description:

In an effort to reduce the amount of chemicals added to oily wastewater and improve discharge quality at the Windsor Engine Plant, it was proposed to modify the Windsor method of oil separation from water. Oily water presents problems for wastewater treatment plants, therefore in the past, chemicals were added to separate oil and water. The Windsor Process used sulfuric acid to lower pH of the oily wastewater and a cationically charged inorganic salt, usually calcium chloride, to react with the soap-like anionic emulsifiers to break their hold on the oil. The pH of the wastewater was then raised to an alkaline level, typically 8.5, with sodium hydroxide. Occasionally, free floating oil and suspended solid particles were skimmed from the surface of the wastewater and the treated wastewater was discharged to the storm sewer.

In order to eliminate the addition of chemicals to wastewater and improve discharge quality, the ultrafiltration process was introduced in cooperation with the equipment supplier in September 1997. Ultrafiltration is an industrial process in which semi-permeable membranes are used to separate water and some dissolved low molecular weight materials from a mixture that is submitted for processing. This pressure-driven process selectively allows the transfer of water molecules through the porous membrane and prevents the passing of oils. The Windsor Engine Plant has benefited from the ultrafiltration process by eliminating chemicals in wastewater treatment and improving discharge quality by reducing phenol concentration.

Objective:

To improve the quality of wastewater discharge and to eliminate chemical usage by installing an ultrafiltration process in the oily waste treatment plant to physically separate oil and water.

Substance(s) being targeted:

Sulfuric acid, sodium hydroxide, calcium chloride, phenol and oil/greases

Targeted Reduction(s):

100% elimination of sulfuric acid, sodium hydroxide, and calcium chloride
Improve discharge quality (reduction concentration of phenol and oil/greases)

Results and Advantages:

- Elimination of chemicals (sulfuric acid, sodium hydroxide, and calcium chloride)
- Approximately 740 tonnes of sodium hydroxide; 220 tonnes of calcium chloride; and 450 tonnes of sulfuric acid are not required each year for treatment of oily wastewater
- Annual chemical cost savings for treatment of wastewater: \$280,000
- Increased efficiency of oil and water separation
- Increased discharge quality - phenol concentration reduced from 2400 µg/L to 138 µg/L

- Loading of phenolics discharged from the oily waste treatment plant are 54% below the Windsor Sewer Use By-Law of 300 µg/L
- Loading of oil and greases discharged from the oily waste treatment plant are 80% below the Windsor Sewer Use By-Law of 120 mg/L

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Process modification

Environmental Media Addressed:

Water

Capital Investment:

\$2,135,100

Barriers Encountered:

Initial costs and new process problems

When was the project completed or expected to be completed:

September 1997

Description of Facility:

The Ford Motor Company Windsor Engine Plant assembles V-8 and V-10 engines for Ford F-series pickups, Full Size Vans, and Utility Vehicles such as the Expedition and Navigator. The plant opened in 1923 and occupies an area of 1.2 million square feet. It employs approximately 2,400 personnel and in 1997 produced over 600,000 units.

Description of the Environmental and Energy Programs:

Environmental programs at this facility include CFC/HCFC management, energy and water reduction, and waste management through a returnable dunnage program which is responsible for recycling 99% of solid non-hazardous waste.

REPLACE ELECTROCHEMICAL DEBURR WITH CASCADE DEBURR

GENERAL MOTORS OF CANADA LIMITED

ST. CATHARINES COMPONENTS PLANT

Project Description:

The Components Plant manufactures final drive assemblies for the front wheel drive transmissions. A part in this assembly is the carrier, a hollow structural housing that supports the differential gears and sun/planetary gear sets. In the manufacturing process both the exterior and interior surfaces of the carriers are machined extensively. The machining generates metallic burrs that must be removed, otherwise these burrs could break free inside of the automatic transmission and cause damage by blocking oil orifices or jamming a control valve.

The deburring process has previously been performed by using an electrochemical deburr. The electrochemical process generated significant amounts of sludge consisting of iron hydroxide, sodium nitrate and water. This electrochemical deburr process was replaced with a mechanical deburr process called "cascade deburr". Advantages of implementing a mechanical deburr process include

- eliminating the requirement for sodium nitrate
- eliminating the requirement for nitric acid
- eliminating the requirement for sodium hydroxide
- eliminating a sludge waste stream
- reducing the floor space required for the process
- producing a cleaner part
- reducing the cost of manufacturing the carrier

The Manufacturing Engineering department initiated this program to enhance the quality of the transmission components. When it was recognized that the project had potential environmental benefits, the environmental officer was engaged to assist in its implementation and quantifying the benefits. The quality improvements included cleaner parts leading to improved quality of the transmissions while achieving savings in the cost of de-burring and reducing environmental impacts.

Substance(s) Targeted:

Sodium nitrate, nitric acid, sodium hydroxide, waste sludge

Targeted Reduction(s):

100% sodium nitrate, nitric acid, sodium hydroxide

90% waste sludge

Results and Advantages:

Switching to the mechanical deburring process resulted in an annual elimination of:

100 tonnes kg of sodium nitrate used in the facility

10 tonnes of nitric acid used in the facility

180 tonnes sodium hydroxide used in the facility

Disposal of 1,000 tonnes of sludge.

The elimination of the sodium nitrate also removed the reportable chemical nitrate ion from the National Pollutant Release Inventory for the Components Plant.

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Activity:

Process substitution

Media Addressed:

Potential Land and Water Emissions

Capital Investment:

\$1,986,000 US dollars

Cost Savings:

Estimated payback period of 1.6 years

Barriers Encountered:

None

Description of Facility

St. Catharines Components Plant builds transmission final drive and differential assemblies, rear axles, front suspensions, brake and drum assemblies and components. The plant, including the Central Office of St. Catharines, comprises 1,340,000 square feet and employs 3000 people.

Description of the Environmental and Energy Programs

As part of the overall waste management system, the Water Treatment Facility at St. Catharines processes approximately 50 million imperial gallons per year from process water collected from the Engine, Foundry and Welland Avenue plants.

In addition, two types of emission control systems are used at the St. Catharines Components Plant.

DISPOSABLE PACKAGING CONVERSION TO RETURNABLE CONTAINERS

DAIMLERCHRYSLER CANADA INC.

WINDSOR ASSEMBLY PLANT

Project Description:

Traditionally automotive parts coming in from suppliers to the Windsor Assembly Plant were packaged in cardboard boxes on wooden pallets or in wooden crates. The cardboard, pallets and scrap wood were collected, sorted and baled and either reused or recycled.

Through a corporate material handling initiative to reduce the amount of dunnage from packaging, the plant embarked on a system to convert the incoming parts from disposable to 95% returnable packaging. Through designing and purchasing of standard sizes steel containers and collapsible plastic pallets, the Material Handling Team was able to eliminate the use of over 3,713 tonnes of cardboard, pallets and waste wood per year since 1993. Vehicle production has increased 17% in this period mainly by going to a three shift operation, so on an adjusted basis over 4,350 tonnes was eliminated from the recycling stream.

Objective:

To eliminate 95% of the cardboard, wooden pallets and scrap wood from entering the plant through implementing the use of returnable containers

Substances/Materials Targeted:

Cardboard, wooden pallets and scrap wood

Targeted Reductions:

95% elimination of cardboard, wooden pallets, and scrap wood from the plant.

Results and Advantages:

Elimination of over 4,350 tonnes of cardboard, pallets and scrap wood from the plant per year. Annual savings for reductions in processing, recycling and packaging material costs estimated at \$9.8 million. Additional savings due to increased Quality as a result of improved housekeeping and reductions in cardboard clutter.

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Process Change, Material Substitution

Media Addressed:

Land

Capital Investment:

Cost of returnable containers - \$6 million

Barriers Encountered:

Convincing suppliers that this change would be advantageous to both parties.

When was the project completed:

1998

Description of Facility:

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 that welds, paints and assembles the popular minivans.

Description of the Environmental and Energy Programs:

Windsor Assembly won the 1992 Ontario Waste Management Corporation Award for Outstanding Reductions of Hazardous Wastes. Extensive recycle programs are also in place. In 1997 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

WATER DIVERSION PROJECT

FORD MOTOR COMPANY OF CANADA, LIMITED

OAKVILLE ASSEMBLY PLANT

Project Description:

Painting phosphating processes require the consumption of large amounts of clean, de-ionized water exhibiting a low conductivity to wash the surface and remove impurities (phosphate) from the metal surface of a vehicle. These processes also generate large amounts of wastewater which add to the burden of the Wastewater Treatment Plants, at both the Oakville Assembly Plant (OAP) and the Oakville municipality. To alleviate these issues, a reverse osmosis system was installed at the OAP to process lake water.

In the reverse osmosis process, lake water is forced under pressure against a membrane that separates the water into two units: permeate and concentrate. The permeate is the fresh water passing through the membrane. This water possesses a low conductivity and is ideal for rinsing the minivan bodies. The remaining stream, or concentrate, has been analyzed and meets the Ontario Ministry of the Environment guidelines for drinking quality and consequently is discharged into the lake.

Upon the incorporation of the project in July 1998, approximately 55,100 m³ of water has been diverted from the Oakville Wastewater Treatment Plant (month of July not included due to shutdown). This system is expected to reduce the flow of wastewater from the OAP Wastewater Treatment Plant to the Oakville Municipal Wastewater Treatment Plant by 480 million litres per year. That is enough water to satisfy the freshwater needs for 1,215 households in the Oakville municipality. Due to these water savings, there will be a 20% reduction of chemicals used to treat the water.

Objective:

To reduce chemical and water usage by introducing a system to decrease the amount of wastewater sent to the regional wastewater treatment plant.

Substance(s) Targeted:

Water consumption, sodium hydroxide, ferric chloride, sulfuric acid, and sludge

Targeted Reduction(s):

30% water reduction (2000 m³/day) and 20% reduction of chemical use

Results and Advantages:

- Expected water savings per year: 480.7 million litres
- Reduction of wastewater results in a savings of \$216,000 CDN (sludge savings not included) per year
- 146.7 tonnes of sodium hydroxide eliminated per year
- 134.3 tonnes of ferric chloride eliminated per year
- 19.4 tonnes of sulfuric acid eliminated per year

- 449 tonnes of sludge eliminated per year
- Annual energy cost savings of \$4,800 Canadian by reducing wastewater at the sewage treatment plant

Environmental Hierarchy:

Pollution Prevention

Pollution Prevention Approach:

Process modification

Environmental Media Addressed:

Water, Solid waste, Hazardous waste

Capital Investment:

\$316,000 US dollars

Barriers Encountered:

Potential production disruption delayed physical project work for approximately three months.

When was the project completed or expected to be completed:

July 1998

Description of Facility:

The Oakville Assembly Plant manufactures 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 of Canada and the Ontario Truck Plant. The facility has 3.8 million square feet of floor area and employs approximately 3,200 people. The plant produces 75 units per hour, on two shifts, for a total of 1,200 units per day and approximately 288,000 per year. The first production began at the facility in 1953.

Description of the Environmental and Energy Programs:

Existing environmental programs at the facility include a wildlife enhancement program, PCB elimination, waste minimization, and Volatile Organic Compound (VOC) reduction. In 1997, an energy management system was installed to enable major electrical users to monitor their efficiency and production performance.

DIRECT DISPOSAL OF OILY FLOC

GENERAL MOTORS OF CANADA LIMITED

GM OF CANADA ST. CATHARINES COMPONENTS PLANT

Project Description:

The Components Plant installed their wastewater treatment plant in 1973. The plant was designed to remove the oil from the process wastewater through the use of dissolved air flotation units (DAFS). The DAFS produce an oily floc that typically has an oil content of 20-30%. The Components Plant originally processed the oily floc to separate the oil and then re-used the oil as a machining coolant. As machine tools were replaced with newer technology which had more stringent coolant specifications, GM was unable to re-use the oil and started to sell the oil as a commodity.

The process to remove the oil from the oily floc involved placing the oily floc into a reactor tank along with sulphuric acid and a de-emulsifier. One of the waste streams produced by this process had to be neutralized with lime which in turn generated a filter cake. Because of the costs, chemicals, and renewed focus on the core business, the Components Plant decided to directly send the oily floc to Safety Kleen for recycling. Safety Kleen, using new technologies is able to thermally separate the oil from the floc in a much more efficient and environmentally friendly manner than the Components Plant was able to. The separation process separates the oil from the floc with steam, resulting in oil, steam, and water components. The water is treated through a typical treatment process, while the oil is distilled for virtual complete re-use. By sending the floc directly to Safety Kleen, the Components Plant was able to:

- reduce the usage of sulphuric acid which reduced the sulphate concentrations in the water effluent.
- reduce the potential of odours escaping to the environment because the odorous operations of heating acidified oil has been eliminated.
- reduce chlorine usage in the process air scrubber because the odour loading has been reduced.
- reduce the use of caustic.
- eliminate the requirement and use of lime
- eliminate the requirement and use of de-emulsifier.
- eliminate the rag interphase and filter cake waste streams.

Substance(s) Targeted:

Sulphuric acid, lime, sodium hypochlorite, rag and filter cake waste streams

Targeted Reduction(s):

100% de-emulsifier, lime

Reduction in sulphuric acid, sodium hypochlorite, waste sludge

Results and Advantages:

Sending the oily floc to an off-site recycler resulted in the elimination or reduction of:

- 212.35 tonnes of de-emulsifier
- 277.51 tonnes of sulphuric acid
- 37.4 tonnes of sodium hypochlorite
- 198.57 tonnes lime
- 74.3 tonnes of caustic
- 800 tonnes filter cake disposal
- 1,206 tonnes rag (water contaminated with oil) waste stream
- 1,500 million BTU steam.

Environmental Hierarchy:

Treatment

Pollution Prevention Activity:

Process modification

Media Addressed:

Potential Land and Water Emissions

Capital Investment:

Nil

Cost Savings

Annual savings of \$490,000 Canadian are projected

Barriers Encountered:

None

Description of Facility

St. Catharines Components Plant builds transmission final drive and differential assemblies, rear axles, front suspensions, brake and drum assemblies and components. The plant, including the Central Office of St. Catharines, comprises 1,340,000 square feet and employs 3000 people.

Description of the Environmental and Energy Programs

As part of the overall waste management system, the Water Treatment Facility at St. Catharines processes approximately 50 million imperial gallons per year from process water collected from the Engine, Foundry and Welland Avenue plants.