



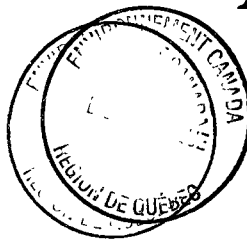
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Pathways to a Greener Future

Environmental Industry in Canada



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Preliminary Version

Preface

This compendium is published by the Technology Transfer Office of Environment Canada. It will be updated every six months to include information on new technologies.

Submissions to the compendium are most welcome and photographs depicting the industry or technology will be included in subsequent issues. The form on page vi may be used to provide information.

Copies of the compendium may be obtained through:

*Environmental Protection Publications
Technology Development Directorate
Environment Canada
K1A 0H3
(819) 953-5921 or (819) 953-5750*

The compendium is also available in French.

*Environment Canada -- Compendium of Environmental Industry Success Stories/
Environnement Canada -- Recueil des réussites de l'industrie de l'environnement*

Title/Titre :

Industry/Industrie :

Address/Adresse :

Description : _____

Success and Economic Benefits/Réussite et avantages économiques : _____

Future Objectives/Objectifs futurs : _____

Contact/Renseignements : _____

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1 Research and Technology Development

Industry

Geophysics and Geology

Technology

Canadian Seabed Research Ltd. is an Environmental Consulting Company specializing in marine and ground geophysics and geology. Their services extend to field data collection, problem solving, interpretation, and GIS digital mapping. CSR's commitment is to innovative, cost-effective solutions for environmental and engineering problems.

CSR has a full range of geophysical equipment for marine technology including: Klein 595 Digital Side Scan Sonar, EG&G Surface Tow Boomer, Echotrac Digital echo sounder, Magnavox Differential GPS system, and sediment coring, grab sampling and underwater video equipment. Digital enhancement of data using ARC/INFO and Image Processing.

The company also has a full range of modern geophysical instruments for ground technology including: seismic refraction, electromagnetic instruments, and ground-penetrating radar.

Success and Economic Benefits

CSR is currently marketing its products and services in the U.S. and Caribbean. It is collaborating with five other firms to examine the Russian market. Other new markets are sought in Mexico, Southeast Asia, Australia, and Europe.

Future Objectives

CSR wants to:

- acquire international marketing assistance
- collaborate in the performance of international aid projects
- act as a local sales and service representative for marine geophysical and GIS products.

Canadian Seabed Research, Ltd.

*Specializing in marine
and ground geophysics
and geology*

341 Myra Road
P.O. Box 299
Porter's Lake, Nova Scotia
B0J 2S0

Phone: (902) 827-4200
Fax: (902) 827-2002

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Elizabeth Hare (manager)
Robert Myers (marine geophysics)
Tony LaPierre (ground
geophysics)
Patrick Campbell (geomatics/
remote sensing)

CEM Corporation

*CEM Corporation and
Environment Canada enter
into a Technology Transfer
Agreement for Analytical
Applications of MAP™
Technology*

**MAP Division
Environmental Technology
Centre
3439 River Road
Ottawa, Ontario
K1A 0H3**

**Phone: (613) 990-9239
Fax: (613) 991-9485**

**Contact:
Dr. Jacqueline Bélanger
(Head, Science)**

Industry

Analytical laboratory operations

Technology

A commercial analytical sample preparation unit, developed by the CEM Corporation, uses the Microwave-Assisted Process (MAP™) under licence from Environment Canada. The advantage of using the MAP method is that extraction times are reduced from hours to minutes, and that the process requires minimal amounts of solvent and produces less waste than conventional methods. MAP is being used in various applications such as the extraction of contaminants from soot, soil and water; essential oils from fresh plant materials; oleoresins from dried spices; and fatty acids and triglycerides from biomass. This technology is quickly gaining acceptance by the analytical community and becoming a method of choice for many analytical laboratory operations.

Success and Economic Benefits

CEM Corporation recently signed a worldwide licence for the use of the analytical applications of MAP for liquid-phase extraction. CEM currently has a sample preparation unit on the market which is based on the MAP technology. The availability of this technology will help "green" analytical laboratories worldwide.

Future Objectives

CEM will continue to work with Environment Canada to develop new analytical equipment for liquid-phase applications of the technology.

Industry

Chemical extraction

Technology

The Microwave-Assisted Process (MAP™) is an Environment Canada patented technology which uses microwaves to selectively and rapidly extract chemicals from various matrices. Solvents which dissolve the sought compounds and are transparent to microwaves are used. The process supports sustainable development through the reduction in the wastes produced and the energy and volumes of solvents used when compared to conventional methods.

CWT-TRAN is working with Environment Canada to further the development and commercialization of large-scale applications of MAP. The recovery of high-value added products from plant material is the main application of interest to CWT-TRAN.

Success and Economic Benefits

CTW-TRAN signed a worldwide licence agreement with an exclusivity in China, South Korea, and Japan for the use of MAP for the processing of natural products using liquid-phase extraction. CWT-TRAN has been investigating several innovative ways of using the MAP technology to improve industrial processes in several Asian countries where traditional processes use excessive amounts of solvent and energy and produce significant amounts of waste.

Future Objectives

CWT-TRAN will continue to work with Environment Canada to further the commercialization of the MAP technology, particularly in export markets.

CWT-TRAN International Inc.

*CWT-TRAN and
Environment Canada
enter into a Technology
Transfer Agreement for the
use of MAP™ to
commercialize the industrial
processing of natural
products*

**MAP Division
Environmental Technology
Centre
3439 River Road
Ottawa, Ontario
K1A 0H3**

**Phone: (613) 991-1840
Fax: (613) 991-1673**

**Contact:
Monique Punt
(Head, Engineering)**

Environmental Packaging Systems Ltd.

*Patented container for
packaging vials containing
diagnostic specimens
for mail or transport*

**1 Research Drive
Dartmouth, Nova Scotia
B2Y 4M9**

**Phone: (902) 461-1300
Fax: (902) 466-6889**

**Contacts:
Barry Sibley (president)
Aka Char (vice president)**

Industry

Packaging

Technology

The company's principal products are its revolutionary patented leak-proof container, 'EPS tube System' specifically designed for the shipment of infectious substances, diagnostic specimens and dangerous goods, and the 'EPS Pouch' both singular and multiple, used to house, absorb, and protect the same type of shipments. Both easy to use and reusable, these products provide optimum protection for handlers and carriers, as well as the environment.

Success and Economic Benefits

Environmental Packaging Systems EPS Tube System has been called the 'post-it-note' of the diagnostic packaging industry. EPS offers a cost-effective and superior product. In addition, EPS has a number of leading edge products under development and testing.

Future Objectives

The company will promote its products on an international level and maintain its ongoing relationship and major customers. This will enable the company to react to changing needs and demands as well as changing legislation. EPS holds tremendous growth potential having attracted the interest and purchase orders, of major international clients. EPS promises to be a strong contender in Canada's biotechnology and environmental industries.

Industry

Environmental auditing

Technology

Land and Sea undertakes all components of a project: initial screening and review; environmental impact assessments; development of environmental monitoring and action plans; environmental management plans; and training.

Success and Economic Benefits

Consulting and management services in environmental aspects of port, waterway and coastal development: dredging/dredged material disposal; ship and port wastes; disposal offshore drilling wastes; coastal zone management; port terminals and facilities; urban waterfront development; port environmental management and waterway/canal developments.

Projects undertaken in over 300 harbours worldwide, from Djibouti to Shanghai.

Future Objectives

Seeking strategic alliances and working partnerships with consulting groups to offer services in environmental planning and management for port, waterway, and coastal developments. Target markets are Southeast Asia and China.

Land & Sea Environmental Consultants Ltd.

*Environmental aspects
of port, waterway and
coastal developments
and construction*

**Suite 620 Belmont House
33 Alderney Drive
Dartmouth, N.S.
B2Y 2N4**

**Phone: (902) 463-0114
Fax: (902) 466-5743**

**Contact:
Dr. Scott MacKnight
(president)**

Pronatex, Inc.

*Pronatex and
Environment Canada
enter into a Technology
Transfer Agreement for
the demonstration of the
MAP™ Technology
for Industrial Processing*

**1, avenue des Pins
Melbourne, Quebec
J0B 2B0**

**Phone: (819) 566-7050
Fax: (819) 566-1622**

(M. Marcel Brosseau, president)

**MAP Division
Environmental
Technology Centre
3439 River Road
Ottawa, Ontario
K1A 0H3**

**Phone: (613) 991-1840
Fax: (613) 991-1673**

**Contact:
Monique Punt
Head, Engineering**

Industry

Industrial processing

Technology

Pronatex is working with Environment Canada to demonstrate the Microwave-Assisted Process (MAP™) to various parties interested in improving the efficiency of chemical extraction processes. MAP is an Environment Canada patented technology that enhances the solvent extraction of chemicals from various matrices using microwaves and microwave-transparent solvents. The process is both selective and rapid and supports sustainable development by using less energy and solvents and producing less waste than conventional methods. Environment Canada and Pronatex are using laboratory and pilot-scale processes to investigate several industrial applications such as the recovery of high-value added products from plant material.

Success and Economic Benefits

Pronatex recently signed a non-exclusive licence in Canada, for the demonstration of MAP™ for processing of natural products using liquid-phase solvent extraction.

Future Objectives

Pronatex will continue to investigate new industrial-scale applications of MAP and opportunities to provide demonstrations of and training on the technology to familiarize potentially interested parties with the advantages of the technology. Pronatex expects to set up an

office in the Hull, Quebec in early 1995 and open a demonstration facility in the Hull area in 1996.

Industry

Water treatment

Technology

National Water Research Institute scientists found that ultraviolet (UV) light of the appropriate wavelength and intensity kills bacteria in sewage effluent as effectively as traditional (chlorine treatment) methods and inactivates some viruses more effectively. Based on these results, and with advice from the National Water Research Institute scientists, Trojan Technologies undertook development of commercial products that range from sewage effluent systems treating 212 million gallons per day (963 million litres per day), to household influent systems that effectively sterilize drinking water. Trojan Technologies supplies approximately 70% of the market share in the global wastewater UV disinfection and is active in more than 35 countries.

Success and Economic Benefits

Ultraviolet light destroys bacteria and viruses without adding anything to the effluent and without changing water chemistry, thus producing an effluent that is non-toxic.

There is a reduction in the loading to receiving waters of persistent chlorinated compounds produced as a result of chemical reaction between chlorine and organic compounds present in the effluent is realized.

There is also a reduction in the release of ozone-damaging chemicals.

The operational costs of ultraviolet treatment plants are comparable to traditional methods.

The elimination of potential chlorine accidents in residential neighbourhoods and the resulting improved safety for plant workers have both social and economic benefits.

In many instances, the installation of an ultraviolet treatment system avoids the expense of building a new well to replace one contaminated with bacteria.

Trojan Technologies Inc.

*Ultraviolet disinfection
technology for treatment
of sewage effluent ---
a clean alternative
to chlorine treatment*

**3020 Gore Road
London, Ontario
N5V 4T7**

**Phone: (519) 457-3400
Fax: (519) 457-3030**

**Contact:
W.L. Cairns**

Varian Canada, Inc.

*Metal plating process
substitutes ultrasonic aqueous
cleaning system for vapour
degreasing with ozone-
depleting substances*

**45 River Drive
Georgetown, Ontario
L7G 2T4**

Phone: (905) 877-0161

Fax: (905) 877-5327

Contacts:
Joe Calderelli (president)
**Gary Spiller (continuous
quality improvement
manager)**

Vern Leis
Branson Ultrasonics
Phone: (905) 475-4640

Jon Lloyd-Jones
Kester Solder
Phone: (416) 368-3777

Industry

Electronic/telecommunication

Technology

Varian Canada Inc. manufactures microwave devices for satellite communications and radar applications. It is part of a large international company that manufactures high-technology products.

Varian phased out its use of freon and 1,1,1-trichloroethane by July of 1993, ahead of the 1996 regulatory deadline.

After rigorous testing, an aqueous cleaner was selected to replace the 1,1,1-trichloroethane in both the machine and plating shops. Existing vapour degreasers could not be modified to use the new aqueous cleaner so Varian purchased an Omni 2000 cleaning system from Branson Ultrasonics which also supplied the aqueous cleaner. The integrated system cleans, rinses, and dries the parts in a single unit.

An ultrasonic cleaning system using an aqueous cleaner replaced the traditional 1,1,1-trichloroethane vapour degreasing system in the metal plating operation. Use of no-clean VOC-free flux in wave soldering and of water-soluble flux in hand-soldering eliminated the need for freon cleaning after soldering. In the hand-soldering case, the old freon vapour degreaser was modified to clean with deionized water.

Freon cleaning after soldering was eliminated by going to a no-clean VOC-free flux in one case, and to a water-soluble flux in another.

Success and Economic Benefits

- Varian Canada Inc. eliminated ozone-depleting substances from its manufacturing processes ahead of the regulatory deadline of 1996.
- It avoided having to put warning labels on products exported to the United States as required under a new U.S. legislation for products that use ozone-depleting chemicals in their manufacture or contain such chemicals.
- Reduced raw material and disposal costs: Savings on the purchase and disposal costs of 1,1,1-trichloroethane are about \$9 200 per year while savings from the elimination of freon are about \$6 250 per year.
- A competitive advantage in the market place was gained by avoiding the need to label products as being manufactured using ozone-depleting substances.

2 Pollution Prevention

Industry

Industrial chemicals

Technology

Donar Chemicals Ltd., established in 1975, has developed an environmentally responsible alternative to highly toxic anti-fouling or marine growth retardant products that are used on boat hulls. The most commercially successful anti-fouling agent on the market is tributyltin (TBT). Soon after its introduction, damage caused by the tin salts contained in TBT was observed in ocean waters. Research done by the Cousteau Society linked abnormalities in oysters from the Arachon Basin in France in 1976 and a severe slump in the number of molluscs in 1980-81 to TBT. After France adopted strict regulations controlling TBT, the Cousteau Society reported that the number of molluscs (oysters, snails, etc.) had risen back to normal levels by 1985. It has been estimated that in France alone approximately one million litres of TBT-based products are applied to boat hulls. The Cousteau Society searched for an alternative to TBT-based products. A variety of products were tested, with the Donar product Sea Coat being found to be even more effective than TBT without having the same harmful environmental impact. Sea Coat is sold for use on pleasure and fishing boats.

Success and Economic Benefits

The highest concentrations of TBT are found in coastal waters. As a result, coastal aquatic biota and more specifically coastal

fisheries are the most susceptible to TBT damage. By using an alternative product such as Sea Coat, which is an epoxy-based chemical, this damage can be avoided.

Development of Sea Coat has created some employment. This is expected to grow once Sea Coat enters the shipyard market.

Individual Action -- Using this product is one way in which consumers can positively affect, on an individual basis, their surrounding environment.

Donar Chemicals

*An alternative
to toxic chemicals*

No. 4, 2350 Beta
North Burnaby, British Columbia
V5C 5M8

Phone: (604) 294-6113
Fax: (604) 439-0872

Contact:
Betty Connelly

EDM
Environmental
Design
Management

*Solar Aquatics Systems --
environmentally sustainable
water and wastewater
treatment systems*

**P.O. Box 34110
1959 Upper Water Street
Suite 707
Halifax, Nova Scotia
B3J 3N2**

**Phone: (902) 425-7900
Fax: (902) 425-7990**

**Contacts:
Jeffrey Pinhey
Margot Cantwell
Ross Cantwell
Albert Andrews**

Industry

Wastewater treatment

Technology

EDM is an innovator in the field of passive wastewater treatment. EDM designs SOLAR AQUATIC Systems, a revolutionary natural wastewater treatment system. EDM provides services and expertise in a diverse number of areas including: Land analysis and Site design, On-site sewage disposal system design; Project management and coordination; Ecosystem management for parks and wilderness; Watershed management studies; Land Reclamation studies; Pollution control studies; Environmental permitting; Environmental economic analysis; Development planning and design; Environmental education; Municipal servicing strategy development and implementation; Contaminated site remediation design; Alternative sewage treatment design; Habitat reconstruction and restoration; Environmental planning and master plan preparation; Geographic Information Systems for Environmental Planning.

Success and Economic Benefits

EDM provides environmental solutions. The complexity of environmental projects often requires an interdisciplinary solution. EDM offers a combination of expertise in the fields of engineering, landscape ecology, and planning and do not hesitate to draw on resources from outside the firm in order to

fully address the needs of a specific project.

Future Objectives

Resort Master Planning;
Sustainable Waste Treatment;
Landscape Ecology

Industry

Battery

Technology

The mercury-free, rechargeable bundle-cell battery is being targeted for use in laptop computers, emergency lighting systems, and wheelchairs. They are a promising alternative for use in hybrid electrically powered vehicles.

The new product is described as a Rechargeable Alkaline Manganese dioxide-zinc (RAM) bundle-cell battery.

Success and Economic Benefits

The new battery is half the weight of conventional lead-acid and nickel-cadmium batteries and free of toxic heavy metals. It is expected to outperform conventional batteries as well.

A major step towards the reduction of the more than 13 tonnes of hazardous chemicals from batteries that are dumped into landfills each year in Ontario.

Future Objectives

Licences for the manufacturing and marketing rights of the RAM technology have so far been granted to companies in Canada, the United States, Hungary, and India. The product is expected to be available from two of the licencees later this year.

Environmental Batteries Systems

*Canadian firm develops
mercury-free rechargeable
battery*

1595, 16th Avenue
Suite 601
Richmond Hill, Ontario
L4B 3P1

Phone: (905) 881-5100 (ext. 225)
Fax: (905) 881-6043

Contact:
Stephen Meldrum

Nacan *Products*

*Zinc-free label
adhesives for the
bottling industry*

**60 West Drive
Brampton, Ontario
L6T 4W7**

**Phone: (905) 454-4466
Fax: (905) 454-5207**

**Contact:
Charlie Bowes**

Industry

Bottling

Technology

The new Super Zinc-Free label adhesive enables beverage bottlers and food producers to meet municipal regulatory limits on discharges of zinc to sewer systems. Since its introduction to the marketplace, the new-formula compound has been used to affix labels to more than a billion bottles.

The addition of small quantities of zinc to casein-based adhesives is designed to "iceproof" labels on beverage bottles, keeping the labels stuck on when the bottles are placed in ice water for cooling. Discharges of zinc to municipal sewer systems has been a problem in the manufacturing of this adhesive. The new-formula compound for the zinc-free adhesive has been developed by chemists at the company's Brampton, Ontario, R&D centre.

Success and Economic Benefits

- Enables compliance with regulatory limits on discharges of zinc to sewer systems.
- Promotes in-plant water conservation efforts (less washing required).
- Acquired an edge in the label adhesive marketplace.

Industry

Sewage treatment

Technology

Mexico is embarking on a major sewage treatment plant construction program. Land application offers a cost-effective method of sludge management but technical assistance is needed to establish a data base that can be used for the development of regulations, specific to Mexican conditions.

Success and Economic Benefits

Two demonstration sites have been established in the State of Guanajuato to establish the impact of sludge application. WTC's extensive experience in Canada has been used in the design of the experiments, the analysis of the data, and the preparation of public education material. The data will be an integral component in the development of preliminary regulations for sludge application.

Future Objectives

WTC will continue to provide technical advice on establishing additional demonstration and full-scale sites in order to expand the data base, to provide comments on draft regulations, and to participate in public education programs.

Wastewater Technology Centre

*Feasibility demonstration
of the application of
sludge to agricultural
land in Mexico*

**Wastewater Technology
Centre
(operated by RockCliffe
Research Management Inc.)
867 Lakeshore Road
Box 5068
Burlington, Ontario
L7R 4L7**

**Phone: (905) 336-4717
Fax: (905) 336-8912**

**Contact:
H.W. Campbell
(vice president,
Residue Management Division)**

**Zerotech
Technologies
Inc.**

*Zero effluent system
for pulp mills*

**855 Homer St.
Vancouver, British Columbia
V6B 5S2**

Phone: (604) 689-0339

Fax: (604) 689-0321

**Contact:
Bob Ward**

**Richard Drolet
(NLK Consultants)
Phone: (514) 875-7950
Fax: (514) 397-1535**

Industry

Pulp and paper

Technology

A zero discharge technology was implemented at a pulp mill (Bleach Chemical Thermal Mechanical Pulp) located at Port Cartier, Quebec. Multiple effect evaporators were used to concentrate liquid effluents which would then be mixed with wood chips from a nearby saw mill, and used as fuel in a modified bark boiler.

Success and Economic Benefits

This was the first pulp mill in eastern Canada to completely "close the loop". The economics are made possible because of the availability and proximity of the saw mill. This system is environmentally sustainable, technically attractive, and generates jobs. Both the pulp mill and saw mill are newly constructed.

Future Objectives

In the future, this technology will be applied to the recovery of energy from pulp and paper sludges.

3 Clean Air Technologies

Industry

Heavy industries

Technology

Albarrie Canada Limited uses sophisticated manufacturing technology to convert synthetic fibres into a wide range of technical fabrics. Applications of these fabrics include:

- removal of particulate from air generated by industries such as cement, power, and steel producers;
- liquid filtration in the process industries;
- pneumatic conveying; and
- liners for containment systems.

Albarrie also provides complete analytical, preventative, and rectification services for dust collectors.

Albarrie engages in a continuous and intensive research program to develop products to satisfy customer needs. An outstanding result of this program is the Albarrie Composite filter media family, demonstrated by field results to be the leading technology for the removal of particulate in dust collectors. For particle sizes between 0.1 and 1.0 μm , Albarrie Composites are the only filter media capable of providing separation efficiency of 99.999 %, a pressure drop lower than 100 mm of water, and a service life of at least three years.

Success and Economic Benefits

Albarrie operates two large manufacturing facilities at its Barrie, Ontario, head office where exports are forwarded to all parts of the world. In addition, the company maintains sales and service outlets in St. Catharines, Ontario; Surrey, British Columbia; Trois-Rivières, Quebec; Lewiston, Maine; and Edgefield, South Carolina.

Almost total removal of particles; reduced capital cost; and reduced energy consumption are realized.

Future Objectives

Higher temperature filtration to eliminate cooling of gases.

Albarrie Canada Limited

*Composite filter media
for removal of particles
from industrial gases*

**85 Morrow Road
Barrie, Ontario
L4N 3V7**

**Phone: (705) 737-0551
Fax: (705) 737-4044**

**Contacts:
Bob Baldwin
Abraham Turkson**

ACME Engineering Products Limited

*Integrated gas detection
and control equipment
for enclosed spaces*

**5706 Royalmount Avenue
Montreal, Quebec
H4P 1K5**

**Phone: (514) 342-5656
Fax: (514) 342-3131**

**Contact:
Steve Presser**

Industry

Gas detection and control instrumentation

Technology

ACME Engineering Products Limited produces a full range of integrated gas detection and control equipment for enclosed spaces to serve the commercial market. A number of the first generation of ACME's products were firsts on the market.

ACME also advises on ventilation to ensure the most effective and efficient application of its controls.

Success and Economic Benefits

ACME systems include:

- Carbon Monoxide Detection and Control Units and Systems
- Carbon Dioxide Detection and Control Systems that can control up to four independent ventilation systems
- Diesel Fumes Detection and Control Unit based on U.S. Bureau of Mines and Canmet research. This device determines the combined noxious effects of NO, NO₂, SO₂, CO, sulphates, and particulate through detection of a surrogate gas. It is the only detection and control unit of its kind on the market
- Gasoline and Diesel Fumes Environmental Control Systems for use when both types of fumes are present
- Volatile Organic Compounds Detection and Control Unit that can be calibrated for various compounds

Future Objectives

ACME has a distribution agreement with a French firm, which is applicable among Europe's Latin-speaking countries. ACME is interested in pursuing similar or joint venture agreements with other European and South American countries.

ACME is interested in discussing transfer agreements in both the air and water pollution instrumentation fields.

Industry

Manufacturing

Technology

BIOTOX is a proprietary regenerative oxidation process whose destruction efficiency exceeds 98% and uses over 90% of the heat generated by the combustion of the VOCs and natural gas to preheat the gases for destruction.

The first commercial application was for asphalt roofing plants. BIOTOX technology is applicable for all manufacturing plants concerned about organic emissions.

Biothermica has developed and patented a hot gas fabric filter for particulate that is effective up to 600°C. The fabric is made of stainless steel.

The first application of the filter was in two bark-burning boilers for a pulp and paper company. The product will be ready for marketing in 1995.

Biothermica International Inc.

*Regenerative oxidation
process for the destruction
of volatile organic compounds
(VOCs) and condensable
organic compounds (COCs).*

Suite 440
3333 Cavendish Boulevard
Montreal, Quebec
H4B 2M5

Phone: (514) 488-3881
Fax: (514) 488-3125

Contact:
Guy Drouin

Northern Telecom Canada Ltd.

Elimination of chlorofluorocarbons (CFCs)

**8200 Dixie Rd.
P.O. Box 3000
Brampton, Ontario
L6V 2M6**

**Phone: (905) 452-2000
Fax: (905) 452-4334**

**Contact:
Richard Quenneville**

Industry

Electronics/Telecommunication

Technology

CFC-113 was used to clean flux residues from printed circuit boards. The use of CFC-113 was eliminated by adopting new soldering processes which make cleaning unnecessary. The flux is sprayed onto the circuit boards at a controlled low-volume rate, they are then wave-soldered using either a Seho Nitrogenous machine or an Electrovert 2000 soldering machine. Because the boards are soldered in a nitrogen atmosphere, they do not require cleaning with CFCs.

Key to the success of the new soldering processes was the development of new fluxes. The new fluxes are generally composed of 98% isopropanol and 2% other chemicals (including adipic acid) and they dissipate almost entirely during soldering.

Success and Economic Benefits

Use of CFCs was completely eliminated from Northern Telecom's manufacturing operations in 85 locations worldwide. At the Bramalea, Ontario, plant alone there were 59 tonnes/year of CFC-containing solvent eliminated. Knowledge gained is being shared with other countries and other industries; Northern Telecom co-founded the Industry Cooperative for Ozone Layer Protection.

There were savings associated with the purchase of CFCs.

The cost of the Seho Nitrogenous machine, which is manufactured in Germany, was \$300 000 while the cost of the Electrovert 2000 soldering machine was \$50 000.

4 Hazardous Waste Management

Industry

Hazardous waste management

Technology

Alberta has taken a lead role in Canada in the treatment of hazardous wastes. The Alberta Special Waste Treatment Centre (the "Centre") at Swan Hills, Alberta, together with a comprehensive hazardous waste transportation system, enables not only the effective management of present hazardous waste flows but also the gradual elimination of hazardous wastes in storage. The Alberta Special Waste Management System is a joint venture between BOVAR Inc. and the Alberta Special Waste Management Corporation, an Alberta crown corporation. The system is operated by Chem-Security (Alberta) Ltd. The Centre is a comprehensive, fully integrated waste management facility.

About two-thirds of all industrial waste generated in Alberta is treated or disposed by the generators on-site. Most of the remaining waste, which cannot be treated or disposed of on-site, is sent to the Centre. The Centre, which accepts nearly every kind of hazardous waste generated in the province, uses a variety of waste treatment and disposal options. Organic wastes such as oil, solvents, and PCBs are treated by incineration in high-temperature rotary kilns, while inorganic wastes such as alkalis, acids, cyanides, and heavy metal-bearing liquids are treated by physical and chemical processes.

Success and Economic Benefits

One of the Centre's achievements has been to develop an effective and environmentally safe technology for decontaminating electrical transformers containing PCBs. The transformer furnace completely decontaminates all components of the transformer and enables useful metals to be recycled. This technology is now patented internationally and is attracting considerable attention from other waste management operations in Canada and abroad.

Residues from the treatment processes are rendered chemically inert, with solid residues mixed with a cementing agent and placed in a specially designed secure landfill. There are no residues or treatment by-products that have to be sent elsewhere for treatment or disposal, with the exception of decontaminated transformers, which are sent for metal recycling. A comprehensive and integrated environmental monitoring program has been in place since 1985, to serve as an early warning system for any environmental changes that might result from the operation of the Centre.

Future Objectives

The Centre began processing waste in 1987. As of September 1994, 61 million kilograms of commercial waste has been safely treated. In 1994, the Centre completed a significant expansion in capacity, in order to eliminate a backlog of primarily solid wastes.

Alberta Special Waste Treatment Centre

*Effective management of
hazardous waste flows and
gradual elimination of
hazardous wastes in
storage*

**#610, 10909 Jasper Avenue
Edmonton, Alberta
T5J 3L9**

**Phone: (403) 422-5029
Fax: (403) 428-9627**

Contacts:

**Tom Thackeray
(Alberta Special Waste
Management Corporation)
Graham Latonas
Chem-Security (Alberta) Ltd.
250, 3115-12 Street N.E.
Calgary, Alberta
T2E 7J2**

**Phone: (403) 235-8300
Fax: (403) 250-3909**

Compass Environmental Inc.

*Treatment systems for
residues from
municipal waste
incineration*

**2253 Belmont Court
Burlington, Ontario
L7P 3N3**

**Phone: (905) 335-1195
Fax: (905) 335-6808**

**Contact:
Steven Sawell**

Industry

Municipal solid waste
management/incineration

Technology

The system consists of a unique combination of treatment/manufacturing processes to generate useful by-products from the residues collected in the air pollution control systems of municipal waste incinerators. Commercial grade calcium chloride and a recyclable lead compound are two of the main marketable products generated. The remaining residue may be useful as an aggregate material for the cement manufacturing industry.

Success and Economic Benefits

The system provides a cost effective means to divert the hazardous material from landfill disposal, thereby avoiding the cost associated with disposal and the liability associated with potential groundwater contamination. The quality of the by-products sufficient to encourage either use in commercial applications or as a raw material for recycling, hence generating a revenue stream to help defray the costs of municipal solid waste management.

Future Objectives

The System has the potential to be adapted to other residue streams that contain high levels of leachable salts.

Industry

Hazardous waste disposal

Technology

A patented chemical reduction process has been developed by ELI Eco Logic Inc. which provides complete, on-site destruction of hazardous organic wastes. Materials such as PCBs are transformed into useful products and uncontrolled emissions are eliminated.

Success and Economic Benefits

The technology was developed to provide high destruction efficiencies and waste volume capabilities without the expense, technical drawbacks, or emissions from incinerators.

Future Objectives

Eco Logic's mobile system the "SE25 ELI Destructor" will be transported to the site in St. Catharines to commence operation in June 1995.

General Motors of Canada Ltd.

*On-site destruction
of hazardous organic
wastes*

**General Motors of Canada Ltd.
1908 Colonel Sam Drive
Oshawa, Ontario
L1H 8P7**

**Phone: (905) 644-6786
Fax: (905) 644-3830**

**Contact:
Stew Low**

**ELI Eco Logic Inc.
143 Dennis Street
Rockwood, Ontario**

**Phone: (519) 856-9591
Fax: (519) 856-9235**

**Contact:
Douglas J. Haillett**

Newfoundland Offshore Burn Experiment (NOBE)

*In-situ combustion of
oil slicks*

**Environmental Emergencies
Science Division
Environmental Technology
Centre
3439 River Road
Ottawa, Ontario
K1A 0H3**

Phone: (613) 990-7297

Fax: (613) 991-9485

**Contact:
Merv Fingas**

Industry

Oil spill cleanup

Technology

The Newfoundland Offshore Burn Experiment (NOBE) was completed successfully on August 12, 1993, about 40 kilometres offshore St. John's, Newfoundland. The \$3.5 million experiment was the culmination of many years of laboratory and large-scale tank studies and planning concerning the *in-situ* combustion of oil slicks contained by fire-resistant booms. Over 20 agencies from Canada, U.S.A., Norway, France, and Japan participated. Seventeen vessels and six aircraft were used, along with remotely controlled sampling systems - including two model helicopters, two boats, a tethered blimp, and a submersible. The experiment was comprised of two *in-situ* combustion experiments, each involving about 50 cubic metres (50 000 litres) of crude oil.

Success and Economic Benefits

Initial estimates were that 99% of the oil was removed by burning, and most of the taffy-like residue was recovered mechanically. The success will lead to the development of operational protocols and guidelines for *in-situ* combustion of oil slicks using fire-resistant containment booms, and the adoption of the technique by many spill-response organizations in Canada and around the world.

5 Reduce, Reuse, Recycle

Industry

Waste recycling sectors

Technology

The Activated Fluidized Bed (AFB) Technology for recycling non-flammable and flammable organic sludge, semisolids, and solids for recovering hydrocarbons has been fully developed and commercialized at the Chem-King/Philip Environmental facility in Barrie, Ontario.

Success and Economic Benefits

Agglo/Chem-King Joint Venture represents a modest recycling unit with an annual recycling volume of approximately 15 000 drums of organic waste. The users benefit from converting waste streams into products for lower treatment cost.

Future Objectives

A future research and technology development should be focused on the value added products manufacturing techniques using waste as raw material.

AGGLO Recovery Inc.

*Commercialization of
AFB System
at the Chem-King/
Philip Environmental
Facility
in Barrie, Ontario, Canada*

**34 Leading Rd.
Toronto, Ontario
M9V 3S9**

**Phone: (416) 740-0188
Fax: (416) 740-1453**

**Contact:
Peter L. Weinwurm**

*Agropur
Coopérative
Agro Alimentaire*

*Transformation of
organic matter into
energy*

**510 Rue Principale
Granby, Quebec
J2G 7G2**

**Phone: (514) 375-1991
Fax: (514) 375-5958**

**Contact:
Claude Hade**

Industry

Processing and manufacturing

Technology

Agropur has installed an anaerobic wastewater treatment system which transforms organic substances into methane. This gas now produces all the energy to operate the plant.

The Agropur cheese factory in Notre-Dame-du-Bon-Conseil generates energy to operate its machinery using products it once discharged into the river. In 1993, Agropur installed an anaerobic wastewater treatment system for its wastewater.

This system transforms the organic matter contained in the wastewater into methane, with which energy is produced to operate the plant's machinery. A conventional treatment system would have cost \$5 million and consumed 2000 kW. Its operation produces approximately \$50 000 worth of biogas a year, more than the energy required to operate similar treatment equipment, and results in net profits of \$10 000 annually. The process also yields a sludge that is of acceptable quality for use on agricultural land.

*Success and Economic
Benefits*

Land Conservation -- By using an anaerobic system and aerated ponds and by selling the sludge or reclaiming it for agricultural uses, Agropur avoids discharging its wastewater. This initiative makes it possible to extend the life of discharges and, as a result, reduces the use of agricultural

land and other land for waste disposal sites.

Energy savings -- The wastewater treatment plant of the Agropur cheese factory uses less energy than conventional plants. The firm is reducing its consumption of natural gas, a non-renewable resource.

Water quality -- Before installing the anaerobic system and setting up the aerated lagoons, all wastewater from the cheese factory was discharged directly into the river, which may have contributed to its eutrophication and an increase in bacteria concentrations.

Agropur -- The firm is realizing annual energy savings of approximately \$150 000; \$50 000 through the biogas generated, and \$100 000 through savings in electricity, apart from the considerable savings with regard to the handling and disposal of sludge.

The production of energy from organic matter in wastewater and its subsequent reclamation for agricultural uses makes it possible to avoid the costs of creating disposal sites and the controversies that ensue.

Industry

Refrigeration and air-conditioning industry, and cross-industry use of CFCs and other ozone-depleting gases.

Technology

The keys to the Blue Bottle® technology are Halozite™, a synthetic zeolite which selectively adsorbs halogenated hydrocarbon gases such as CFCs, HCFCs and HFCs, and Halozone's proprietary process of desorbing the gases without chemical breakdown to a high purity standard (ARI-900-73). Halozone's innovative refrigerant recovery products and services complement existing recovery methods and eliminate virtually all emissions of refrigerant in various processes including routine purging of low pressure centrifugal chillers and during service and decommissioning of air conditioning and refrigeration equipment. Halozone's Toronto Reclamation Facility provides reclaimed refrigerant which allows users to operate their refrigeration and air conditioning equipment until the end of its useful life, thus deferring the expense of conversion to alternative chemicals or cooling processes.

Halozone also builds turn-key systems for on-site recovery that capture and reclaim dilute airborne emissions in industrial settings. In some cases, the end product is returned directly to the industrial process without further purification. These industrial uses of halogenated hydrocarbons include CFCs used as solvents, cleaners, and other industrial processes, the fumigation gas - methyl bromide, and the retardant - halon.

Success and Economic Benefits

The use of adsorption and Halozite in Halozone's worldwide patent-protected Blue Bottle technology and on-site units allow users to continue to operate their present equipment without releasing ozone-depleting or greenhouse gases into the atmosphere.

The products and services built around the Blue Bottle technology are changing the way the refrigeration and air conditioning industry handles refrigerants and provide services while meeting Montreal Protocol targets and local government regulations. The benefits for the industry are reduced labour, faster turnaround while avoiding emission of regulated gases.

Future Objectives

Halozone will continue to develop products and services for the refrigeration and air conditioning industry and Toronto Reclamation Facility. The company is in negotiations to sell a new reclamation facility and all the associated products and services.

Halozone Technologies Inc.

*Recovery, recycling, and
reclamation of
chlorofluorocarbons (CFCs),
hydrochlorofluorocarbons (HCFCs),
hydrofluorocarbons (HFCs),
and methyl bromide*

**4000 Nashua Drive
Mississauga, Ontario
L4V 1P8**

**Phone: (905) 405-8200
Fax: (905) 405-8333**

**Contact:
Dusanka Filipovic**

Labatt Brewery

Water conservation

**P.O. Box 776
1600 Notre Dame
Winnipeg, Manitoba**

**Phone: (204) 697-5100
Fax: (204) 632-9088**

**Contact:
Jim Boyda**

Industry

Processing/manufacturing

Technology

Labatt Winnipeg Brewery has adopted a closed-loop water-cooling system that drastically reduces the amount of city water required in the pasteurization process: significant savings are expected two years into the project.

The cold bottles enter the pasteurizer, are heated to a specific temperature and then cooled down for labelling and packaging. The cooling zones use city water which runs to the sewer. The company re-used this water with a closed-loop water-cooling system for the cooling zones which consist of a hold tank, glycol heat exchanger, and a pump. The average water savings is 45 gallons per operating minute.

Success and Economic Benefits

The long-term benefit is the conservation of water.

The savings generated will pay the cost of the project in approximately two years. The future savings will help the plant to reduce costs and subsequently remain competitive.

Reducing the water use can have many spin-off results as the city's population expands. If current users reduce their requirements, it could eliminate the need to enlarge water supply systems to the city. It would also reduce the need to enlarge sewage treatment facilities.

Industry

Sales and repairs of laser printers

Technology

Hard coat re-coat of Organic
Photo Conductors and
refurbishing of toner cartridges.

Success and Economic Benefits

Founded in 1990, the company began as a "cottage" industry. It expanded rapidly, moving first to small commercial premises, then to their present location. The company has grown by 100% or more each year. Head Office employs 17 staff. LaserWorks has seven franchises in the Maritimes. It recently opened an office in Vancouver employing 8 people and has 3 people working as dealers on Vancouver Island.

Future Objectives

Sales and service of laser printers, specializing in marketing re-usable products. LaserWorks focuses on promoting the economic efficiencies of "environmentally friendly" technologies.

Markets currently being examined include Hong Kong, Indonesia, China, Chile, Mexico, Spain, Portugal, England.

LaserWorks is considering expansion within Canada to Calgary, Edmonton, Winnipeg, and Toronto.

LaserWorks Computer Services, Inc.

*Eastern Canada's
largest producer of
re-usable laser
printer toner
cartridges*

**Burnside Industrial Park
P.O. Box 8663, Stn. A
Halifax, Nova Scotia
B3K 5M4**

**Phone: (902) 468-5430
Fax: (902) 468-2186**

**Contacts:
Robbie MacLeod
John Woodford
Dan Beals
Tony Linton**

Mohawk Oil Co. Ltd.

*Alternative fuels and
recycling used oil*

**6400 Roberts Street
Burnaby, British Columbia
V5G 4G2**

**Phone: (604) 293-4129
Fax: (604) 293-4190**

**Contact:
Jeff W. Campbell**

Industry

Petroleum

Technology

Mohawk Oil is a leader in the production of ethanol-blended gasolines and re-refined motor oil, both of which help reduce the impact of automobiles on the environment. Mohawk's ethanol gasoline and re-refined oil are certified by the Environmental Choice Program.

Ethanol is a high-octane, water-free alcohol produced by fermenting grain, sugar, or other agriculture or forestry products. When blended with gasoline, ethanol adds oxygen to the fuel, which helps reduce smog levels in city environments.

Ethanol-blended gasolines reduce carbon monoxide emissions by up to 20% for 5% blends and up to 40% for 10% blends. Ethanol also reduces hydrocarbons (HC) by up to 15% for 10% blends with no significant effect on nitrous oxides (NO). Once the ethanol has been burned, the carbon dioxide and water vapour produced are easily re-absorbed by living plants, completing a natural carbon cycle that helps to reduce the greenhouse effect. In automobiles, the higher octane content of ethanol blends promotes more efficient burning at lower engine temperature, prolonging the life of the engine and exhaust system.

Mohawk Lubricants Ltd. collects more than 33 million litres per year of used lubricating oil, equalling approximately 30 000 tons of potentially hazardous waste that is removed from the environment. The plan produces 18 million litres of base

oil every year which is blended to produce quality lubricants.

Success and Economic Benefits

In 1989, Environment Canada presented the first-ever award for Corporate Environmental Leadership to Mohawk to recognize the development of Mohawk's used oil collection and re-refining operation in British Columbia.

Ethanol in gasoline reduces the use of non-renewable crude oil resources, is an effective replacement for lead in gasoline, and acts as a natural detergent, and gasoline antifreeze.

Waste Oil recovery also reduces the use of non-renewable crude oil resources, and effectively removes waste oil from the environment. Mohawk's waste oil collection program provides industry throughout B.C. with a safe, reliable, responsible means of disposing of used motor oil.

Production of ethanol provides for new markets for surplus, low grade grains as well as distillers dry grain, a high protein product used as livestock feed. Economic benefits accrue to local prairie communities through employment in the ethanol plant, and local services required.

6 Education and Training

Industry

Education

Technology

The CCHREI has defined three sectors of environmental employment (environmental protection; conservation and preservation of natural resources; and environmental education, communications, and research). As of January, 1995 the CCHREI has also identified and documented the skills and knowledge needed by professionals, technicians, and technologists working in the environmental protection sector.

Success and Economic Benefits

The CCHREI's work will lead to the development of national standards for the certification of individuals and the accreditation of environmental courses and programs.

Future Objectives

The ultimate goal of the CCHREI is to ensure a high-quality environmental workforce that has the mobility and commonality of skills to work anywhere in North America, and which has the right skills to enable Canada's industry to successfully compete anywhere in the world.

Canadian Council for Human Resources in the Environment Industry (CCHREI)

*Environmental human
resources*

**Suite 700, 700-4th Avenue S.W.
Calgary, Alberta
T2P 3J4**

**Phone: (403) 233-0748
Fax: (403) 269-9544**

**Contact:
Mary-Ann Kenney**

*Canadian
Environmental
Technology
Centre - West*

*Improving technology
transfer*

**CETAC - West
#400-S
8500 MacLeod Trail South
Calgary, Alberta
T2H 2N7**

**Phone: (403) 777-9595
Fax: (403) 777-9599**

**Contact:
Joe Lukacs**

Industry

Education and training

Technology

As part of the federal government's Environmental Industries Strategy, three Canadian Environmental Technology Advancement Centres have been established to serve Canada's growing environmental industry. The centres have been set up as corporations dedicated to increasing the use of technology to solve Canadian and international environmental problems by improving technology transfer from research and development, through to demonstration and adaptation. One of these, the Canadian Environmental Technology Advancement Corporation - West (CETAC-West), was set up in 1994 to serve the provinces of Manitoba, Saskatchewan, Alberta, and British Columbia. CETAC-West will provide small-to-medium sized enterprises in western Canada with access to comprehensive technical and business services for commercializing environmental technologies. It will operate as a private, not-for-profit organization, at arm's length from the federal government.

Industry

Education

Technology

The Co-Op Atlantic Ecology Program is different from other retailing approaches. It provides reliable, unbiased information to help co-op shoppers make responsible, ecological choices. A wide range of every day products are reviewed, screened, and selected by an external Advisory Committee. Bilingual shelf-talkers point the way to these products on co-op store shelves, and describe why each is the best ecological choice. The Ecology Program also discusses ecology issues in brochures called EcoGuides, and includes a video, information in grocery flyers, and training for store staff.

Instead of using a 'green marketing' approach, the Ecology Program adds value by highlighting products with ecological merit. For example, EcoLogo products licensed by the Federal Environmental Choice Program are automatically included.

The Ecology Program is based on co-operatives' deep commitment to the communities they serve. Each co-op is owned and controlled by the people who shop there. The Ecology Program is focussed on helping co-op members protect the ecology of their communities. Shoppers at co-op stores can trust the information provided by the Ecology Program.

Success and Economic Benefits

The Ecology Program encourages shoppers to purchase

products with minimal impact, such as those which are 'Refillable', made of 'Recycled Materials' or a 'Re-usable product'. The shelf-talkers help sort out the tangle of product claims and advertising hype. Sometimes they contain novel information, such as identifying vinegar as an 'alternative cleaner' in the baking aisle.

The companion Eco-Guides help people recognize there are things they can do to protect the ecology of their communities. The EcoGuides explain how our lifestyle affects the ecology, and they outline contaminants we each contribute. The Program also motivates action on community ecology issues, through support to store Ecology Teams who work on special projects.

The roots of the Ecology Program in the co-operative movement, means there is beneficial impact on the community at large. People in the community, as members of their co-op, can take action together on issues, from plastic bag recycling to litter cleanup. The Ecology Program also provides information and support to co-op members on opportunities which could benefit them. It also supports community groups directly, such as the Earth Wardens environmental education program and the Clean Nova Scotia Waste Reduction Week.

CO-OP Atlantic

*Unbiased information is
made available to
customers in order for
them to make more
responsible and
ecological choices*

**P.O. Box 750
123 Halifax Street
Moncton, New Brunswick
E1C 8N5**

**Phone: (506) 858-6457
Fax: (506) 858-6477**

**Contact:
Julia Chadwick**

*Industrial
Commercial
Institutional
Environmental
Managers
Association of
British Columbia
(ICIEMA)*

*Improving environmental
performance in business*

**ICIEMA
P.O. Box 3741
Vancouver, British Columbia
V6E 4A6**

**Phone: (604) 685-0275
Fax: (604) 684-6241**

**Contact:
Tim Lederer**

Industry

Education

Technology

The ICI Environmental Managers Association is a group of individual managers representing various corporations who are committed to improving their environmental standards. The group meets once a month for lectures on environmental and business topics.

In the past, the primary objective of any corporate manager was to maximize the profits of his or her organization, with little regard for the environmental fallout associated with production of goods or services. Fortunately, the last ten years have seen the drive towards better products at lower costs, all corporations must pay attention to the way their activities affect our environment.

The positive changes in corporations' environmental philosophies and the change in public attitudes has spawned a need for environmental management - provided by an individual or individuals responsible for guiding the corporation's activities in the most environmentally responsible manner possible. The ICIEMA is an association formed to serve those individuals in the industrial, commercial, and institutional sectors.

*Success and Economic
Benefits*

The ICIEMA was formed in January of 1992 and is now in its third year of operation. In the past year, we have successfully brought together the interests and knowledge base of numerous

British Columbian, Canadian, and multinational corporations.

Through the forum of our monthly meetings we have discussed numerous topics including energy conservation and energy management, the CFC issue, hazardous waste management and environmental diligence and what to do if you are charged with an offense under the *Waste Management Act*.

7 Sustainable Development

Industry

Pulp and paper

Technology

Several water usage reduction techniques were investigated. The most economical having immediate payback were implemented. Several waste treatment technologies were studied, in order to completely "close the loop".

Success and Economic Benefits

A high degree of expertise and process know-how was acquired by Beak Consultants, Ltd. Water discharge was reduced from 31 m³/t to about 15 m³/t. Water recycling was implemented successfully with more than 80% of the environmental gain achieved. At the moment, final effluent treatment involves the use of an activated sludge process.

Future Objectives

The next phases of the project will investigate the effect of further reductions and recycling on the paper production quality.

*Beak Consultants,
Ltd.*

*Closed loop
technologies at the
F.F. Soucy TMP Mill*

**Carré Dorval
455, boul. Fénelon
Suite 104
Dorval, Quebec
H9S 5T8**

**Phone: (514) 631-5544
Fax: (514) 631-5588**

**Contact:
Paul Stuart**

Centre and South Hastings Recycling Board

*Municipality supports
sustainable
development*

**Centre and South Hastings
Recycling Board
270 West Street
Trenton, Ontario
K8V 2N3**

**Phone: (613) 394-6266
Fax: (613) 394-6850**

**Contact:
Jill Dinkley
Recycling Coordinator**

Industry

Municipal cleanup

Technology

Enthusiastic support is the best way to describe the Blue Box 2000 program, launched in 1991 by the Centre and South Hastings Recycling Board. It's a coalition of 15 rural and urban municipalities in Central Ontario, with a goal of diverting 50% of household waste from landfills. YIMBY, standing for Yes in my Back Yard, was a program component which distributed free composters door-to-door throughout the area. Other parts of the program included a household hazardous waste depot and an Office of Waste Reduction to help keep things going.

Success and Economic Benefits

Over 70% single family households now participate in backyard composting. Nearly 17 000 tonnes of material has been diverted from landfill, and best of all, there is ongoing enthusiastic public support.

Industry

Private/manufacturing

Technology

It was 20 years ago that S.C. Johnson voluntarily removed CFCs from aerosol products, 12 years before government legislation, and its role as an environmental leader has continued since then. The maker of such consumer brands as Pledge and Windex has instituted guidelines to respect and protect the environment in all phases of business. For instance, heavy metals are excluded from inks, dyes and pigments, and recycled materials are used extensively in packaging and office materials.

Success and Economic Benefits

Factory emissions were reduced by 60%. The company was corporate sponsor of the United Nations Global Youth Forum in 1993, sponsored 20 young Canadian Environmentalists to attend the conference, and funded the Apps Mill Nature Centre in Brantford, Ontario.

*S.C. Johnson &
Son Ltd.*

*Respecting the environment
in all phases of
business*

**S.C. Johnson & Son Ltd.
1 Webster Street
Brantford, Ontario
N3T 5R1**

**Phone: (519) 758-6555 ext. 466
Fax: (519) 758-6631**

**Contact:
Josie McDonagh
Manager, Public Relations**

Sun Chemical Ltd.

*Volatile organic compounds
(VOCs) greatly reduced
with EcoTech inks at
Enviro Print*

**12 Shaftsbury Lane
Brampton, Ontario
L6T 3X7**

**Phone: (416) 749-8133
Fax: (416) 745-1357**

**Contact:
Blake Greenwood**

Industry

Printing

Technology

Enviro Print uses only "environmentally friendly" materials and processes which include:

- inks made with vegetable oils and rosin resins that give off few VOCs
- acid-free oxygen bleached papers with a high recycled content
- an electrolytic silver reclamation system
- aqueous subtractive plates
- citrus rather than solvent-based wash solution for the presses
- phosphate-free fountain solution with low alcohol content
- brown paper wrapping and recycled cartons
- certain material used to enhance the look of a printing job are not used, nor is shrink wrapping

Enviro Print worked closely with its supplier, BASF Coatings & Inks Canada Ltd., to develop and test the Eco Tech inks. These inks are made mostly with linseed oil mixed with some soybean and canola oils. Petroleum distillates account for only about 4%, on average, compared with about 25% for most lithographic, sheet-fed inks. Sun Chemical Ltd., which has since acquired BASF's printing inks division, supplies the Eco Tech inks in the complete range of process and Pantone colors, at

prices comparable to conventional sheet-fed lithographic inks.

Success and Economic Benefits

Some positive aspects of this technology:

- The inks are made from renewable resources (composed of 76 to 87% vegetable oil and rosin resins).
- The small amount of petroleum distillates means that the ink gives off few volatile organic compounds (VOCs) as it dries. VOCs are linked to the formation of ozone, a pollutant at ground level.
- The Eco Tech inks have better stability, smoothness and coverage compared with conventional lithographic sheet-fed inks.
- Other Toronto area prints have followed the Enviro Print example and are now using the Eco Tech inks.

The Eco Tech inks are available in the complete range of process and Pantone colors, at prices comparable to conventional lithographic sheet-fed inks.

8 Site Remediation

Industry

Site remediation

Technology

Project sites had been used as storage and distribution terminals for various light and heavy fuels as well as lubricants.

Contamination resulted over time from leaking underground fuel lines, tanks, and spills from operations.

Success and Economic Benefits

Canada Soil Exchange Ltd. successfully remediated nearly 100 000 tonnes of contaminated soil. In all cases the soil was reused as clean backfill.

Valuable landfill space was not consumed. Cleanup criteria were achieved and independently confirmed, relieving the client of future liability.

Future Objectives

To address other market opportunities, CSE is pursuing the remediation of soils contaminated with semi-volatile organics, PAHs, and heavy oils.

Canada Soil Exchange Ltd.

*Remediation of soil
contaminated with
petroleum hydrocarbons
using Low Temperature
Thermal Desorption
technology*

6 Lansing Square
Suite 106
North York, Ontario
M2J 1T5

Phone: (613) 820-0073

Fax: (613) 820-6925

Contact:
Franklin Holtforster
(president)

Bob Pottruff
(Regional Manager)

Phone: (416) 496-7908

Fax: (416) 499-7159

Great Lakes Action Plan - Cleanup Fund

*Transferring technology
between agencies and
organizations potentially
faced with sediment
removal*

**Environmental Protection
Branch
Environmental Technologies
Division
Environment Canada
Ontario Region
25 St. Clair Ave. East
Toronto, Ontario
M4T 1M2**

**Phone: (416) 973-1098
Fax: (416) 948-4406**

**Contact:
Griff Sherbin
(manager)**

Industry

Contaminated sediment
removal/dredging

Technology

Under the Contaminated
Sediment Removal Program
(CSRP), technologies for
removing sediment were
identified for field testing. Each
had to meet criteria identified by
Environment Canada to be
considered.

Candidate technologies must:

- cause minimal resuspension;
- maximize solid content;
- have good manoeuvrability;
- be capable of being
positioned accurately;
- be mobile; and
- be suitable to hydrodynamic
conditions.

General operational and
performance standards were
developed for auditing the field
testing of the technologies.

Success and Economic Benefits

The demonstrations completed to
date have shown that
environmentally sensitive
technologies exist that are
capable of meeting the
operational and performance
standards delineated by
Environment Canada.

Future Objectives

Environment Canada is
continuing to investigate
innovative technologies for their
demonstration and use in
full-scale cleanups and in other

"Areas of Concern" (identified by
the International Joint
Commission).

Increased awareness in the
dredging community is evident
and interest in improved
management practices for
dredging in the Great Lakes is
growing.

The potential for participation
between regulatory agencies and
industry on joint cleanups is
promising.

Industry

Site remediation

Technology

The Canada Creosote site, a former wood preservative operation that operated from 1924 to 1962, is located on the south bank of the Bow River a short distance upstream of downtown Calgary.

In 1989 creosote was observed seeping from the river bank into the river. Initial testing revealed that an estimated 22 million litres of creosote wood preservative from 40 years of use, was sitting in pools on the bedrock, and that creosote had also moved into the gravel underlying the river bed. Further investigation showed that creosote was also present below a residential street on the north bank.

First estimates of remediation costs were \$50 million to \$100 million depending on whether the river gravel needed to be cleaned and replaced. Faced with such high costs it was decided to carry out extensive environmental impact tests and conduct multiple risk assessments for different scenarios, ranging from "do nothing", to "contain", to "pump out", and "clean and replace the river gravel". This extensive testing delayed the remediation by two years and cost about \$2 million. However the result of the risk assessments showed that the risk to the environment and human health could be reduced to an acceptable level by merely containing the creosote. Consequently a containment wall placed along the river bank and a groundwater intercept system is

presently in the design stage with construction scheduled for 1995.

Success and Economic Benefits

Total cost of the remediation, including the cost of installation and removal of a temporary containment berm in the river, will be \$12 million which includes all the testing and risk assessment work. This is considerably less than the \$100 million it would have cost for remediation, thus demonstrating the value of risk assessment and risk management.

National Contaminated Sites Remediation

*The remediation of the
Canada Creosote
contaminated site provides
a lesson in the value of
extensive and expensive
risk assessments*

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Industry

Site remediation

Technology

Volatile organic compounds in groundwater are treated using ultraviolet light and hydrogen peroxide as part of a pump and treat reinjection strategy.

Success and Economic Benefits

Groundwater contaminants are treated to drinking water standards in a cost-effective way. On-site analysis has significantly reduced operating costs and allowed for an expanded monitoring program.

Future Objectives

This work has led to research and development in the areas of by-product identification and intrinsic remediation for long-term aquifer polishing.