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High Technology Opportunities

b2422967(E)

*Quality knows no bounds...*



*Canadian technology,  
expertise and resources*

*Industrial  
Wastewater  
Management*

**Canadian  
partners for  
global  
markets**

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Dept. of External Affairs  
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APR 15 1992

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Canada

## ***A partnership with Canadian firms offers...***

### **A wealth of technological know-how**

- A pool of highly skilled engineers, scientists and computer specialists
- Internationally renowned research and education institutions
- University researchers who are actively working with industry
- A network of government laboratories oriented towards industrial development

### **A sound base for penetrating the global market**

- Human resource base ideally suited to world competitiveness
- Abundance of natural resources
- World-class research and development infrastructure
- Low energy costs and abundant water supply
- Land and building costs substantially lower than in other industrialized countries
- Communication and transportation facilities among the world's finest
- Secure and free access to North American markets under the Canada-U.S. Free Trade Agreement

### **A competitive financial infrastructure**

- Served by a well-established financial community with global capacity
- Financial and technical support for industrial research and development
- Government cost sharing on capital investment in most regions and incentives for product development
- Tax structures competitive with all industrialized nations
- The Canadian tax system provides greater incentives for companies to engage in R&D than that of any other major industrialized country

### **A unique position to conduct business**

- As the world's seventh largest trading nation, Canadian companies are well positioned to conduct business on a global scale
- Canada has earned a reputation for developing solutions to complex problems in a number of technology-intensive areas. Two noteworthy examples are the pulp and paper industry and ore extraction and processing.

This document was created to help expand business cooperation between Canadian and foreign firms in the industrial wastewater management industry. The document consists of three sections. The first outlines business opportunities in Canada, and the second, reasons why Canadian firms make good partners when establishing a business base in rapidly expanding global markets. The third section provides profiles of Canadian firms and research institutes seeking co-operative business arrangements with their foreign counterparts.

Canada is committed to building on its substantial base of intellectual capital, expertise and accomplishments in technology intensive fields such as industrial wastewater management. Our competitive business environment, technological know-how, financial support, and well-established R&D infrastructure are highlighted in this document.

Le présent document a été produit dans le but de favoriser l'accroissement de la collaboration entre les entreprises canadiennes et étrangères oeuvrant au sein de l'industrie du traitement de l'effluent industriel. Il comprend trois parties. La première décrit les possibilités d'affaires au Canada, tandis que la seconde brasse un tableau des raisons pour lesquelles les entreprises canadiennes sont des partenaires de choix lorsque vient le temps d'implanter une base commerciale au sein des marchés internationaux en pleine évolution. Quant à la troisième partie, elle présente des profils d'entreprises et d'instituts de recherche canadiens désireux de conclure des accords de coopération avec des sociétés ou organismes étrangers.

Le Canada s'est engagé à accroître ses fort nombreuses compétences et connaissances dans les domaines à forte concentration technologique tels que celui du traitement de l'effluent industriel, et à y augmenter ses réalisations déjà considérables. Le présent ouvrage met en lumière notre climat commercial concurrentiel, notre abondant savoir-faire sur le plan de la technologie, nos sources de financement ainsi que notre excellente infrastructure en matière de R-D (recherche et développement).

43. 262. 553

Diese Brochüre wurde erstellt, um geschäftliche Kooperationsmöglichkeiten zwischen kanadischen und ausländischen Firmen, die auf dem Gebiet der industriellen Abwassertechnik tätig sind, zu fördern. Sie ist in drei Teile gegliedert. Der erste Teil gibt einen Überblick über Geschäftsmöglichkeiten in Kanada und der zweite, Gründe warum kanadische Firmen gute Partner sind, wenn man in diesem weltweit schnell wachsenden Markt der industriellen Abwasserreinigung neue Geschäfte erschließen will. Der dritte Teil enthält Leistungsprofile kanadischer Firmen und Forschungsanstalten, die bereit sind, mit ausländischen Firmen zusammenzuarbeiten.

Kanada fühlt sich verpflichtet, auf einer hervorragenden Grundlage von intellektuellem Kapital, Sachverstand und Leistungsfähigkeit in technologieintensiven Gebieten, sowie industrielle Abwassertechnik, aufzubauen. Unsere wettbewerbsfähige Wirtschaft, den Besitz von technologischem Know-How, finanzielle Unterstützung, und gut eingeführte Basis im Bereich Forschung und Technologie sind in dieser Brochüre zusammengefaßt.

Industry, Science and Technology Canada - Industrie,  
Sciences et Technologie Canada

External Affairs and International Trade Canada -  
Affaires extérieures et Commerce extérieur Canada

Investment Canada - Investissement Canada

b2422967(E)



*Industrial  
Wastewater  
Management*

**Canadian  
partners for  
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## **Canadian firms make excellent partners**

Canadian companies bring with them sound manufacturing, distribution and development facilities for industrial wastewater products and services. To any business partnership, Canadian firms bring specific experience and know-how.

Canada recognizes that water pollution prevention and environmental protection have become cornerstones of corporate policy of most major industries who have made a commitment to be environmentally responsive and responsible.

Opportunities in the application of industrial wastewater products and services exist and are growing in a number of specific markets.

- Pulp and paper
- Metal mining and refining
- Petroleum refining
- Electrical power generation
- Iron and steel
- Organic chemicals
- Inorganic chemicals
- Metal finishing
- Industrial minerals

For example, current estimates regarding the environmental costs of complying with new regulations controlling pulp mill effluent in Canada are estimated to be \$4 billion.

Your firm will find significant benefits in forging alliances with Canada's growing community of industrial wastewater management (IWWM) companies and supporting groups.



Wastewater Technology Centre – process development

**The opportunities  
are good for  
co-operating with  
Canadian  
companies**

***Unrestricted access to a very rich North American market***

- The Canada-U.S. Free Trade Agreement (FTA) will increase the availability of duty-free engineering and customer support services.
- FTA will make nearly all goods used in industrial wastewater management duty-free within 3 to 9 years.
- FTA also prohibits non-tariff barriers in both countries.
- As of January 1, 1991 the general Goods and Services Tax will make Canadian manufactured exports tax-free, hence increasing our competitiveness on the world market.

***Rapid growth in IWWM requirements for the North American industrial sectors***

- The North American market for water supply and wastewater treatment facilities, products, and services now exceeds \$30 billion per year.
- The legislated rehabilitation of existing water quality-control systems will generate billions of dollars of additional revenue for companies ready to respond to this need.
- In the United States, complying with new environmental regulations, such as the Clean Water Act, has resulted in additional capital expenditures worth approximately \$80 billion.
- Canada, as the centrepiece of its environmental program, has the Canadian Environmental Protection Act (CEPA). This is considered to be one of the toughest pieces of environmental legislation in the world. Impending revisions to the Act will result in increasingly more stringent effluent requirements with diligent enforcement and heavy penalties for non-compliance.
- Individual provinces are also directing their attention to stricter environmental controls. For example, in Ontario, industrial effluents are being monitored under the Municipal-Industrial Strategy for Abatement (MISA) in order to enact strict abatement regulations.

***Strong research and development infrastructure***

- Highly skilled work force in place
- Technical institutions which are global leaders
- University researchers who are actively working with industry
- World-class research facilities
- Professional/technical associations with strong links to U.S. and other international societies



Kenox Corporation — Wet air oxidation

**Canada's offer  
to industrial  
wastewater  
management  
firms**

**T**he Canadian embassy and consular staff will provide information and contacts enabling your company to assess:

- Prospective Canadian joint venture partners
- The market potential for your products
- Distribution channels
- Financing mechanisms
- Supporting infrastructure including materials and fabrication
- Availability of specialized skills
- External research support
- R&D incentives
- Government financial support for capital investment and product development
- Consultants who specialize in the wastewater management industry
- Other contacts you require



Zenon Environmental Inc. — Membrane technology

## **Why you should join forces with a Canadian partner**

**11** reasons why your firm should join forces with a Canadian partner. The charts that follow illustrate these reasons in more detail.

### **Know-how**

1. Worldwide recognition of Canadian technological know-how in industrial wastewater management
2. A sound technical base for penetrating the global market

### **Markets**

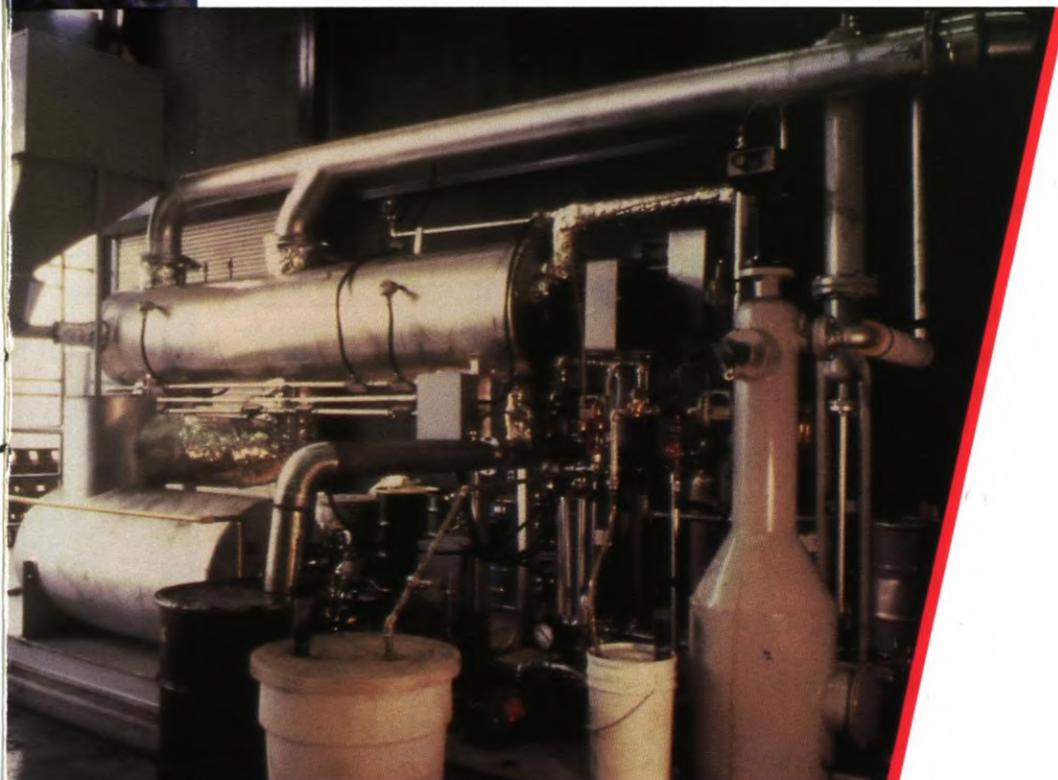
3. Highly efficient transportation and advanced communications network with major global markets
4. Secure and free access to the North American market under the Canada-U.S. Free Trade Agreement

### **Finance**

5. Cost advantages
6. Internationally competitive tax structures
7. Government financial support for R&D, product development, and export marketing
8. Financing available for all stages of business growth

### **Infrastructure**

9. Highly qualified work force
10. Universities and government research labs which are working with businesses
11. Expanding Canadian companies who are interested in co-operation



SNC EnerSludge – Oil from sludge

**Chart 1**  
**Worldwide**  
**recognition in**  
**industrial**  
**wastewater**  
**management**  
**(IWWM)**

Canadian IWWM firms, associated research and development centres and universities have played a large role in developing Canadian expertise, know-how and technical solutions to complex wastewater treatment requirements.

Some examples are:

- Anaerobic Bio-Filters . . . . . Energy Recovery
- Sequencing Batch Reactors . . . . . High-quality Effluent at Low Cost
- Biological Nutrient Removal . . . . . Exceptionally High P & N Removal
- Reciprocating Ion Exchange . . . . . Metal Ion Extraction and Recovery
- Membrane Systems . . . . . Selective Ion Separation
- Automated Polymer Dosing . . . . . Up to 40% Polymer Saving
- Ultraviolet Oxidation . . . . . Complex Organics Destruction
- Ultraviolet Disinfection . . . . . Alternative to Chlorination
- Wet Air Oxidation . . . . . Complex Organics Destruction
- Sludge Pyrolysis . . . . . Production of Oil from Sludge
- Clean Process Technology . . . . . Chlorine Replacement in Pulp and Paper Processing

**Chart 2**  
**A sound technical**  
**base for**  
**penetrating the**  
**global market**

Canada has recognized strengths in such fields as:

- Pulp and paper technology
- Use of advanced technology in ore extraction and processing
- Automated metal working, welding and assembly systems
- Specialty products, i.e. gantry robots, laser cutting equipment, vision systems
- Automated manufacturing cells and flexible systems
- Nuclear reactor technology
- Hydroelectric power plants
- Biological solutions to waste problems
- Bioremediation technology for contaminated sites
- Space technology, i.e. space robotics, flight simulation, satellite design and application of satellite communication, and remote sensing

**Chart 3**  
**Integrated communication and transportation allow efficient and rapid servicing of markets**

- Most reliable telephone system in the world with direct-dial global access. For example, an overnight direct-dial 5-minute telephone call:

From Canada to:	\$Cdn
France	7.21
United Kingdom	7.21
Singapore	9.26
Hong Kong	10.80
Germany	11.48
Taipei	11.48
Japan	12.22
Italy	13.02
Warsaw	14.90

- Global common-carrier computer and electronic mail networks.
- 1-day air courier service across the entire continent with no customer delay. Typical charges for packages to the United States:

* less than 0.1 kg	\$Cdn 23.50
* 0.1-1.0 kg	\$Cdn 38.00
* 1.0-5.0 kg	\$Cdn 60.00

- Frequent air links between all parts of Canada and the rest of the world.

	Vancouver	Calgary	Winnipeg (flight hours)	Toronto	Montreal
New York	6.5(s)	5.0	4.5(s)	1.5	1.0
San Francisco	2.0	1.5	3.0	5.5	7.5(s)
Amsterdam	9.5	8.5	11.5(s)	7.0	6.5
Paris	13.5(s)	12.5(s)	12.0	7.5	7.0
London	9.0	9.5	10.0(s)	7.0	6.5
Frankfurt	9.5	9.0	11.5(s)	7.5	7.0
Prague	12.0(s)	14.0(s)	14.0(s)	11.0(s)	9.0(s)
Moscow	14.0(s)	17.0(s)	16.0(s)	12.0(s)	9.0
Tokyo	9.5	11.5(s)	14.5(s)	13.0	15.0(s)
Hong Kong	13.0	16.0(s)	17.0(s)	18.5	20.0(s)
Taipei	15.0(s)	17.5(s)	21.5(s)	20.0(s)	21.5(s)
Singapore	18.5(s)	22.0(s)	23.0(s)	23.5	24.0(s)

(s) Shortest time with a stopover.

**Chart 4**  
**Canada-U.S.**  
**Free Trade**  
**Agreement**  
**guarantees**  
**market access**  
**for industrial**  
**wastewater**  
**companies**

The Canada-U.S. Free Trade Agreement (FTA) was ratified in 1989. Under its provisions, all goods and services will pass across the border freely by 1999.

**For parts and products**

- All duties on parts which enter Canada from the United States, and which are subsequently incorporated into products and exported, are refunded in total by the Canadian government.
- Those parts, assemblies, or final products which now carry duty will have these duties removed in stages every year. In 3 to 9 years the duty will have fallen to zero.

**Sample duty percentage on parts entering Canada from the United States:**

Commodity	1988 tariff %	Years to duty-free status under FTA
Filtering or purifying machinery and apparatus for water and associated parts	9.2	3
Pumps (with some exceptions)	9.3	3
Large iron/steel tanks	7.8	9

**Sample duty percentage on parts entering the United States from Canada:**

Commodity	1988 tariff %	Years to duty-free status under FTA
Filtering or purifying machinery and apparatus for water and associated parts	3.9	3
Pumps (with some exceptions)	3.0	3
Large iron/steel tanks	2.6	9

**For sales, installation, and servicing of products**

- Canadian citizens who are engaged in business activities in the United States can enter that country by simply presenting their proof of citizenship and declaring their type and field of business.
- Types of business entry are visitor, professional, trader/investor, or intra-company transferee.
- The seven types of business activity are:
  - Research and design
  - Marketing
  - Sales
  - Distribution
  - After-sales service
  - Expansion, manufacture and production
  - General services

**Chart 5a**  
**International comparison of graduate engineering salaries**

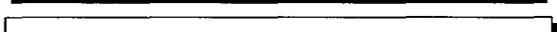
	Median Salary <sup>a</sup> \$US
United States	51 200
Western Europe	47 000
Canada	45 000
Mexica, Central and South America	32 000
Rest of World (Africa, Asia, Middle East, Australia)	29 500

<sup>a</sup> Based on results of 1990 survey.

Source: Chemical Engineering, June 1990.

Note: All Canadian employees enjoy guaranteed basic government health care plan benefits, and every Canadian employee may contribute up to 20% (to a maximum of \$3 500 of salary tax-free to private pension plans.

**Chart 5b**  
**Composite electrical costs index, 1988<sup>a</sup>**

Vancouver		79
Stockholm		98
Montreal		100
Atlanta		100
Taranta		111
Boston		130
London		168
Frankfurt		171
Paris		177
Milan		182
Takyo		219
New York		232

Note: Based on service of 200 000 kWh per month at 600 v and 500 kW utilization.

<sup>a</sup> Montreal is assigned an index of 100.

Source: Montreal Urban Community, Office of Economic Expansion, 1989

**Chart 5c**  
**Exchange rates between Canada and various countries**

Year	Number of Canadian Dollars Per				
	US Dollar	German Deutsche Mark	Japanese Yen	French Franc	UK Pound
1985	1.365	0.468	0.00577	0.153	1.770
1986	1.389	0.643	0.00830	0.201	2.039
1987	1.326	0.738	0.00919	0.221	2.173
1988	1.231	0.703	0.00961	0.207	2.193
1989	1.184	0.630	0.00861	0.186	1.942
1990 (4 months)	1.170	0.697	0.00784	0.206	1.947

Source: Bank of Canada, May 1990

## Chart 6a

**An  
internationally  
competitive tax  
structure**

**Tax treatment of R&D - Canada vs major industrial countries**

	Corporate income tax (percent)	Tax credits (allowances)		
		Percent	Increment (I) or level (L)	Current, capital or both
Canada-Ontario <sup>a</sup>	40.3	25/37.5	Both	Both <sup>b</sup>
Canada-Quebec <sup>a</sup>	32.0	20	L	R&D wages
United States-California	40.1	20/8	I	Current
United States-Illinois	36.6	20	I	Current
Australia	39.0	N/A <sup>c</sup>	N/A	N/A
Japan	50.75	20	I	Both <sup>b</sup>
Korea	39.75	10	L	Both
France	39.0	50 <sup>d</sup>	I	Both <sup>b</sup>
Federal Republic of Germany	56.0	7.5	L	Capital
Italy	46.37	N/A	N/A	N/A
Sweden	52.0	N/A	N/A	N/A
United Kingdom	35.0	N/A	N/A	N/A

<sup>a</sup> Current tax rates; from July 1, 1991 these rates will be reduced by 2 percentage points due to a full phase-in of the manufacturing and processing tax reduction (5 percent).

<sup>b</sup> Except buildings.

<sup>c</sup> Not applicable.

<sup>d</sup> In addition, firms that did not perform R&D prior to 1987 can claim a volume tax credit of 30 percent on the excess over 1987 spending levels.

Source: The Conference Board of Canada, May 1990

- Canada's tax treatment of R&D is more favourable, compared to other leading economic nations.
- The Canadian corporate income tax system provides a number of significant R&D tax incentives for firms. It allows for a 100% deduction for current (1990) R&D expenditures, as well as for capital expenditures made on R&D machinery and equipment. In addition, there is an investment tax credit on qualifying R&D expenses incurred in Canada. The rate of the credit is 20% of R&D expenditures. Both current (1990) expenditures and expenses on machinery and equipment qualify for the credit.

**Chart 6b**  
**Comparison of**  
**Canadian and**  
**U.S. corporate**  
**income tax**

	Canada	United States
Federal tax rates <sup>a</sup>		
-for general business	28%	34%
-for manufacturing	24%	34%
Provincial and state tax rates	5.5% to 17%	0% to 12%

<sup>a</sup> The Canadian federal tax rates are effective July 1, 1989. At present there is also a 3% federal surtax on corporate income tax.

**Depreciation**

Canadian depreciation rates are somewhat lower than U.S. rates, but are still higher than those based on the economic life of the asset.

	Canada	United States
Percent of capital gains included as income (as of January 1, 1990)	75%	100%
Treatment of operating losses by carry-over years	Back 3 years Forward 7 years	Back 3 years Forward 15 years
Consolidation of companies	Not permitted	Permitted for subsidiary at least 80% owned
Minimum tax	no minimum corporate tax	alternative minimum tax of 20% of defined alternative minimum taxable income
Intercorporate dividends	100% deductible	80% deductible

Source: Investment Canada, 1990

## Chart 7 Financing offshore operations

### Government support for product customization and R&D

Canada provides one of the richest R&D climates to assist foreign companies in meeting product customization requirements. For example, a firm which has to modify an industrial wastewater treatment system is eligible for up to 75% reimbursement of R&D wages and salaries.

### Financing of receivables due from foreign customers

Many provincial governments provide support for export activity by way of low-interest loans based on receivables due from foreign customers. This support can be timely when the Canadian affiliate of a foreign firm needs cash to achieve a proper launch outside of Canada.

In addition, Canada's venture capital and commercial banking industries are competitive and amenable to participating with Canadian affiliates of foreign firms.

Canada's commercial banking facilities are among the largest in the world. Introductions to the appropriate financial institution can be arranged quickly by Investment Canada.

### Other areas of financial support include:

- Applied R&D at government or university labs
- Entrepreneurial assistance for product engineering
- Technology transfer
- Market research
- Trade shows
- Export financing

## Chart 8 Financing availability and options

Foreign companies operating in Canada can obtain financing in a number of ways:

- By using their homeland bank and private sources, and importing this capital. There are no restrictions on capital inflows to Canada, and no restrictions on repatriating capital and dividends.
- By using Canadian capital sources.
- By using U.S. capital sources which are readily available in Canada. Interest rates are generally at least 3% higher in Canada, and a more conservative management philosophy of capital exists here.

There are a variety of financing mechanisms available at each stage of business development.

	Typical use of funds	Sources of funds
Seed	Set up, develop prototype	Government, private
Growth	Plant for first sales or distribution	Venture capital, private, government
Expansion	Drive sales in new market	Venture capital, merchant banks, government, public offering
Mature new plant, merger		Banks, merchant banks, public offering

### Estimated investment in technology-based companies

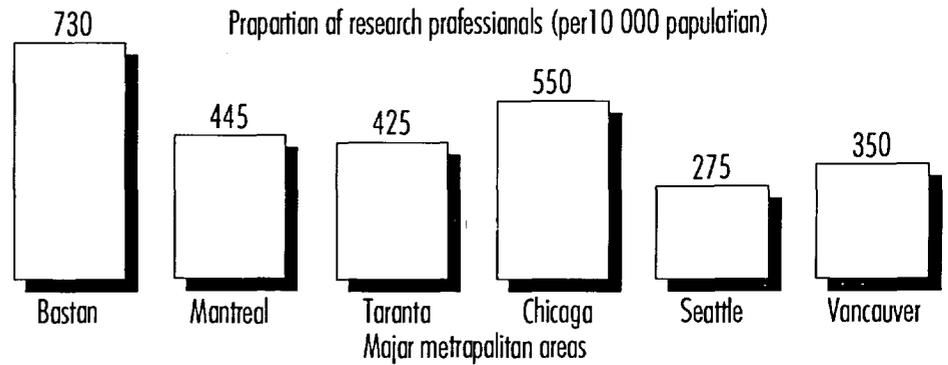
(Millions of \$ CDN)	1981	1984	1987	1988
By government agencies	368	545	658	750
By venture capital	N/A	100	98	97
By public stock offering	N/A	1 230	995	735

Source: Statistics Canada, Venture Economics Canada Limited, Toronto Stock Exchange

## Chart 9 Human resources

The availability of talented research professionals is critical to the creation, development and utilization of new technologies. Canada's major metropolitan areas are highly competitive with similar U.S. centres in this respect.

### Relative intensity of research capabilities Selected Canadian and U.S. metropolitan areas, 1989



Source: Science, Technology and Economic Analysis Division (ISTC) /OECD

### Experienced specialized skills

Canada has a population of 26.5 million people. In this pool are talented men and women with special schooling and practical work skills in Industrial Wastewater Management.

### Academic and vocational graduates in Canada

- Bachelor and Professional degree programs are typically 4 years of university.
- Master's work is 1-2 years, and a doctorate is 4-5 years of work in the graduate school level.
- Vocational college degrees are typically 2-3 years in length.

	Bachelor degree 1988	Master and doctorate degree 1988
Civil engineering	981	393
Chemical engineering	649	204
Mechanical engineering	1 857	279
Electrical engineering	1 997	444
Chemistry	935	364
Biology	3 944	394
Computer science	2 753	363

### Community college diplomas in career programs, 1986-87

Chemical technologies	770
Computer science/ mathematics	3 577
Electrical/electronic technologies	3 963
Engineering technologies	5 415
Environmental and conservation technologies	615

Source: Statistics Canada

## Chart 10 Industrial wastewater management (IWWM) research and engineering infrastructure

### Science and technology — Canada's competing edge

Canada's leading science and technology agency is the National Research Council (NRC). NRC contributes to Canadian companies' practical ideas, inventions, technical know-how, industrial research assistance, world class facilities and the largest collection of scientific and technological data in North America. With a staff of 3 000 located in 15 laboratories across Canada, NRC encourages various types of arrangements with Canadian companies for the use of these facilities and expertise.

Major research centres are located in British Columbia, Saskatchewan, Manitoba, Ontario, Quebec, Nova Scotia and Newfoundland.

The areas covered are diverse as biotechnology to robotics to space science.

Examples of specific research and engineering establishments across Canada are:

#### British Columbia (Greater Vancouver)

- University of British Columbia has a large IWWM graduate program
- Wastewater Technology Centre — an environmental research centre

#### Alberta (Edmonton)

- University of Alberta is the second largest university in Canada and has a large, well-established IWWM graduate program
- Vegreville Environmental Centre — a provincial research centre
- Alberta Research Council — oil and coal related technologies are a special area of expertise.
- Alberta Special Waste Management Corporation — responsible for the management of industrial wastes at its Swan Hills facility.

#### Saskatchewan (Saskatoon)

- Saskatchewan Research Council — uranium and potash related industries are a special focus of activity

#### Manitoba (Winnipeg)

- Freshwater Institute (federal) — water research on inland waters
- University of Manitoba — a graduate industrial waste management program

#### Ontario

- Fifteen universities are located here
- Six major universities with IWWM research programs
- University of Waterloo — world leader in computer technology
- Wastewater Technology Centre — world-class wastewater management R&D centre

- Ontario Waste Management Corporation — Ontario Crown Corporation with expertise in industrial and hazardous waste management
- Ortech — Ontario Crown Corporation active in IWWM research and waste exchange
- Canada Centre for Inland Waters — world-class water research centre
- National Research Council with 9 research facilities
- Federal government research centres in
  - physics
  - electronics
  - optics
  - communications
  - agriculture
  - mining/exploration
- Centre for Groundwater Research — University of Waterloo

#### Quebec

- Two major universities with IWWM research programs
- Biotechnology Research Institute (NRC), Montreal
- Two large centres active in IWWM research
- Pulp and Paper Research Institute of Canada — Montreal

#### Atlantic

- Centre for Cold Ocean Resources Engineering (St. John's, Newfoundland) — world-renowned research centre for the marine environment

## Chart 11

### **A strong industrial wastewater management infrastructure**

#### **Canadian IWWM companies serve these major industries:**

	Atlantic	Quebec	Ontario	Prarie	Western
• Pulp and paper	*	*	*	*	*
• Metal mining and refining	*	*	*	*	
• Petroleum refining	*	*	*		*
• Electrical power generation	*	*	*	*	*
• Iron and steel	*	*	*		*
• Organic chemicals		*	*		*
• Inorganic chemicals				*	
• Metal finishing	*	*	*		*
• Industrial minerals		*	*		*
• Food and beverage	*	*	*	*	*

#### **Canadian IWWM firms have many professional links**

- Water Pollution Control Federation (WPCF)
- International Association for Water Pollution Research & Control (IAWPRC)
- Canadian Society for Civil Engineering (CSCE)
- American Society for Civil Engineering (ASCE)
- American Institute for Chemical Engineering (AIChE)
- and many other industry and professional associations



**Canada**

## **Strategic partnerships**

### **ADI Limited**

P.O. Box 44, Station "A"  
Fredericton, New Brunswick  
E3B 4Y2

Telephone: (506) 452-9000  
Facsimile: (506) 459-3954

Jahn R. Dean, President  
Dr. Robert C. Landine, Vice President

### **Major products/services**

- **ADI-BVF low-rate anaerobic reactor**
- **Anaerobic filters in various flow configurations**
- **Anaerobic sludge blanket reactors**
- **Hybrid reactors**
- **Sequencing batch reactors**

ADI Limited offers the above wastewater treatment processes and engineering consulting to match treatment objectives.

### **Desired alliance with other firms**

Greater access to new markets through licensing, know-how or joint venture arrangements.

### **Company history**

ADI Limited is one of Atlantic Canada's largest and oldest firms of consulting engineers and planners. Founded in 1946, ADI has 130 engineers, planners, technologists, technicians and office staff. ADI's Environmental Engineering Division consists of 25 environmental, civil and chemical engineers and supporting staff, seven of whom hold advanced degrees.

- Sales: Greater than \$10 million
- R&D expenditure: \$100 000 - \$200 000
- Employees: 150  
Research and development: 4 - 8  
Marketing: 10 - 12
- Current markets operating in:  
Canada, United States, Western Europe, India, Caribbean

(continued)

# **ADI Limited**

(continued)

## **Technological expertise**

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ADI provides reliable, cost-effective solutions to wastewater problems through its Environmental Engineering Division.

The Company has pioneered the use of innovative technology in the treatment of industrial and municipal wastewater. It is a leader in the development and application of anaerobic processes, biogas utilization, design and installation of membrane liners, the use of microprocessor controls and telemetric instruments as well as research into sequencing batch reactors.

## **Products developed**

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Clients are provided with a range of services for wastewater treatment and disposal including wastewater flow and characterization studies, treatment feasibility studies, design of treatment works, construction supervision, operator training and plant operations (aftercare). Clients are provided with a complete "characterization to aftercare" package.

## **Products in development**

---

ADI Limited has an ongoing R&D program to develop reliable, cost-effective wastewater treatment systems. Current development includes process advances for low-rate anaerobic reactors, anaerobic-aerobic treatment systems and sequencing batch reactors.

**Canada**

## **Strategic partnerships**

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### **Aer-O-Flow Environmental Inc.**

1175 Appleby Line, Unit C3  
Burlington, Ontario  
L7L 5H9

Telephone: (416) 335-8944  
Fax: (416) 335-8972

Harry Marshal, President

#### **Major products/services**

---

Liquid waste treatment systems, oil water separators, flow meters, dissolved air flotation, package sewage treatment systems and aeration systems.

#### **Desired alliance with other firms**

---

Provide new innovative technology to the North American market via joint venture or equity participation.

#### **Company history**

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Aer-O-Flow Environmental Inc. is a wholly owned Canadian company doing business across Canada consecutively since 1963. The company splits its activities between the industrial and municipal wastewater management markets.

- Sales: Less than \$5 million
- R&D expenditure: \$100 000
- Employees: 21  
    Research and development: 1
- Current markets operating in: Canada, United States

#### **Technological expertise**

---

Liquid waste treatment and solids separation.

#### **Products developed**

---

Rotating fine screens for high solids removal efficiency, pumping station flowmeters, oil-water separation systems to 190 L/s.

#### **Products in development**

---

New multi-purpose flow meter/data logger and denitrification systems for on-site sewage treatment.

Canada

## **Strategic partnerships**

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### **Biobrn Division (Bio-Char Inc.)**

7729 8th Line S.  
Hornby, Ontario  
L0P 1E0

Telephone: (416) 875-4600  
Fax: (416) 876-1854

J.B. Derrick, President  
C.G. Kerr, Managing Director

### **Major products/services**

---

- **Incineration**  
*Combustion heat exchange*

### **Desired alliance with other firms**

---

Completely open to any type of arrangement where the work is within our field of specialization.

### **Company history**

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Biobrn Division of Bio-Char Inc. has been in the combustion and heat exchange field since 1954. Expertise includes the design and manufacture, including contract patents, of incineration equipment. A patent is pending for a process which converts animal blood to protein. Assets include a plant and land. Biobrn is wholly Canadian owned.

- Sales: \$1 to 5 million
- R&D expenditure: \$25 000 to 100 000
- Employees: 10
- Current markets operating in: In the past, our market has been within Canada. Biobrn Division is currently negotiating with several countries to expand our market outside Canada.

### **Technological expertise**

---

Moisture eliminating (drying) by various means, incineration in various forms, heat recovery, combustion techniques.

(continued)

## ***Biobrn Division (Bio-Char Inc.)***

(continued)

### **Products developed**

---

Coiled tube bailers, burners (especially pitch, peat, wood and waste), environmentally protected combustion handling.

### **Products in development**

---

Removal of moisture from animal blood, recycling of special products, e.g. diatomaceous earth, alumina from sludge.

**Canada**

## **Strategic partnerships**

### **Bioclear Technology Inc.**

3924 Main Street  
Winnipeg, Manitoba  
R3C 4A3

Telephone: (204) 339-8327  
Facsimile: (204) 339-1224

Dr. Brian H. Topnik, President  
David Romanow, Chief Executive Officer

### **Major products/services**

- **Modular sequencing batch reactors**  
**Package plant fabrications**  
**Turnkey installation capabilities**

Bioclear Technology Inc. designs and fabricates modular sequencing batch reactor wastewater treatment systems and equipment. Package plant fabrications use steel, concrete and fibreglass. The company provides a turnkey installation capability for both industrial and municipal wastewater treatment requirements.

While the primary market addresses municipal wastewater treatment requirements, the emphasis of SBR technology application is shifting with recent applications to the snack food, pulp and paper, and dairy industries.

### **Desired alliance with other firms**

Bioclear Technology Inc. is a biological treatment/technology company. Other firms could be of assistance in providing peripheral physical or physico-chemical equipment; e.g., pretreatment, sludge handling, disinfection. Joint ventures enquiries arrangements.

### **Company history**

Bioclear Technology Inc. is a wholly Canadian-owned company incorporated in August 1989. Principals of the Company include Dr. B. Topnik, P. Eng., of Topnik and Associates Ltd., with more than 20 years' environmental engineering consulting, experience, and Mr. D. Romanow and Mr. J. Romanow of Roman Equipment Services (1973) Ltd., a general contracting firm, specializing in water and wastewater projects, with up to 30 years of experience. Bioclear has fabricating facilities with 13 employees.

- Sales: Less than \$5 million
- R&D expenditure: \$200 000
- Employees: 20
  - Research and development : 2
  - Manufacturing : 13
  - Marketing : 5
- Current markets operating in:  
Canada, United States, Europe

(continued)

# **Bioclear Technology Inc.**

(continued)

## **Technological expertise**

---

Dr. B. Topnik, P. Eng., has been a Canadian developer of SBR technology since 1977. The Company produces state-of-the-art automatic controls. The PLC control has remote monitoring capacity. Patent is pending on the Bioclear Control Panel. The Company has more than 30 years of experience in wastewater system installation and operation.

## **Products developed**

---

The design, fabrication, installation and operation of SBR wastewater treatment systems for all biologically treatable industrial wastewaters.

## **Products in development**

---

Products in development reflect our main emphasis on industrial wastewater applications using SBR Technologies. Research and development is moving towards a complete automatic remote monitoring capability of SBR installations.

Canada

## Strategic partnerships

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### **Bionov CNP Inc.**

81 St. Pierre, 4th Floor  
Quebec, Quebec  
G1K 4A3

Telephone: (418) 692-1357  
Facsimile: (418) 694-9674

Yvan Pouliot, President  
Rodrigo Moreno, Managing Director

### **Major products/services**

---

- **Bioprocess technology applications**
- **Solar technology applications**

The Company provides technical and economic studies for opportunities of bioprocess technology application. Facilities are available for bench- to pilot plant treatability and process investigations. The Company is also investigating the application of solar technology to wastewater treatment.

### **Desired alliance with other firms**

---

Open to different types of associations.

### **Company history**

---

Bionov CNP Inc. is a wholly owned Canadian company founded in 1985. The activities of the Company are oriented to biotechnology which is applied in environmental and agri-food industries.

- Sales: Less than \$1 million
- Employees: 3  
    Research and development: 2
- Current markets operating in: Canada

### **Technological expertise**

---

Bionov CNP Inc. has expertise in the use of micro-algae for wastewater treatment and biomass production in solar-activated systems.

### **Products developed**

---

Consulting services in micro-algae wastewater treatment and biomass production as well as solar biotechnology.

**Canada**

## **Strategic partnerships**

### **Boojum Research Ltd.**

21 Dundas Street, Suite 405  
Toronto, Ontario  
M5B 1B7

Telephone: (416) 861-1086  
Facsimile: (416) 861-0634

Margarete Kalin, President

### **Major products/services**

- **Ecological engineering**
- **Biological polishing using the CHARA process**

### **Desired alliance with other firms**

Geotechnical engineering, organic waste producing companies would be of interest to Boojum Research Ltd.

### **Company history**

This wholly Canadian-owned research and development company was incorporated in 1984. Its research focus has been on the development of wastewater treatment systems using biological polishing applied to acid mine drainage.

- Sales: Less than \$1 million
- R&D expenditure: \$100 000
- Employees: 5  
    Research and development: 5

### **Technological expertise**

- Employ macrophytic algae CHARA for removal of SS radionuclides and some heavy metals from alkaline waters.
- Ecological engineering measures pertaining to the mining industry re: acid mine drainage amelioration.
- Development and implementation of "walk-away" conditions for inactive mining sites.

(continued)

# ***Boojum Research Ltd.***

(continued)

## **Products developed**

---

The CHARA process - removal of suspended solids and metals from solutions

The ARUM process - microbial generation of alkalinity through carbon sources provided by cattails

## **Products in development**

---

Further development of the CHARA and ARUM processes and implementing these at mining sites.

**Canada**

## **Strategic partnerships**

### **Conestoga-Rovers & Associates Ltd.**

651 Colby Drive  
Waterloo, Ontario  
N2V 1C2

Telephone: (519) 884-0510  
Facsimile: (519) 884-0525

Frank A. Rovers, President

### **Major products/services**

- **Consulting services**

**Civil**

**Environmental**

**Wastewater treatment**

**Water treatment**

CRA provides consulting services in civil, environmental, water and wastewater treatment, engineering and solid waste management as well as in the fields of hydrogeology, chemistry, risk assessment, environmental planning and impact assessments and project management.

### **Desired alliance with other firms**

Joint venture arrangements for projects requiring contaminants' removal from groundwaters.

### **Company history**

CRA, an environmental engineering firm, was formed in 1979 by amalgamation of Conestoga Engineering Limited and Frank A. Rovers & Associates Ltd. and was incorporated as Conestoga-Rovers & Associates Limited in 1981. CRA is wholly Canadian-owned and operated. Branch offices are located in Mississauga, Hanover and Belleville, Ontario, with an associated company, Conestoga-Rovers and Associates Inc., based in Niagara Falls, New York, Minneapolis, Minnesota and Chicago, Illinois.

- Sales: Greater than \$10 million
- Employees: 250
- Current markets operating in: Canada, United States

### **Technological expertise**

Expertise in the area of toxic and hazardous waste management (hydrogeological investigations, landfill design, remedial work design and management, environmental audits, contract administration); hydrogeology; geology; geotechnical engineering; chemistry; water and wastewater treatment; water supply and sewerage; waste treatment; stormwater management; watershed management; environmental planning; environmental assessment; landfill gas control, recovery, utilization; field instrumentation and monitoring.

(continued)

# **Conestoga-Rovers & Associates Ltd.**

(continued)

## **Products developed**

---

Hydrogeology and alternate methods for the treatment of  
contaminated surface and subsurface waters

Canada

## Strategic partnerships

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### **Decom Medical Waste Systems Inc.**

25 Valcourt  
Gatineau, Quebec  
J8T 4Y6

Telephone: (819) 568-0386  
Facsimile: (819) 568-9235

Patrick Francoeur, Vice-President

### **Major products/services**

---

- **Biomedical waste management**
- **Biomedical waste transportation equipment**
- **Incineration of biomedical and pharmaceutical waste**

Biomedical waste management, specializing in infectious materials handling using containers which comply with TD9R standards (permit SH2511), biomedical waste transportation equipment, incineration of biomedical and pharmaceutical waste.

### **Desired alliance with other firms**

---

Applied technology for management of infectious waste and ashes, applied technology for biomedical incineration sites. Joint venture arrangements.

### **Company history**

---

The company is wholly Canadian-owned.

- Sales: Greater than \$10 million
- R&D expenditure: Less than \$5 million
- Employees: More than 100
- Current markets operating in: Canada, United States

### **Technological expertise**

---

Technologies associated with/to biomedical waste incineration such as biomedical waste transport and storage, incineration, ash management, air emission control and wastewater treatment.

(continued)

# ***Decom Medical Waste Systems Inc.***

(continued)

## **Products developed**

---

Implementation and management of incineration sites, management and operational methods of incinerators, applied technology for handling and transport of biomedical waste from biomedical waste incineration and facilities operations, containers, applied equipment for transport of infectious material.

## **Products in development**

---

On-site low-cost treatment of waters that exceed government standards, higher combustion standards for incinerators, furan and dioxin reduction programs for air emissions.

Canada

## **Strategic partnerships**

### **Eco-Tec Ltd.**

925 Brock Road South  
Pickering, Ontario  
L1W 2X9

Telephone: (416) 831-3400  
Facsimile : (416) 831-3409

Dr. P.J. Simmons, President

### **Major products/services**

- **Wastewater treatment process technology**

- **Acid purification units**

- **Chromic acid purification units**

- **Chromic acid recovery units**

- **Metal salts recovery units**

- **Water de-ionization unit**

### **Desired alliance with other firms**

Further expansion of product distribution network.

### **Company history**

Eco-Tec Ltd. is a wholly Canadian-owned company, the majority being employee-owned. Eco-Tec was incorporated in 1970. Eco-Tec Inc. serves the North American market and the Far East. Eco-Tec (Europe) Ltd. was opened in 1987 to manufacture, service and sell to the European market.

- Sales: Not disclosed
- R&D expenditure: Approximately 5% of sales
- Employees: 65
  - Research and development: 15
  - Manufacturing: 11
  - Engineering, accounting and service: 39
- Current markets operating in: Canada, United States, all European countries, China, Korea, India, Mexico, Australia, Japan, Taiwan

### **Technological expertise**

The novel Ion Exchange process for metal removal and recovery from process streams marketed by Eco-Tec was originally developed at the University of Toronto in the Chemical Engineering Department during the 1960s.

### **Products in development**

- Systems for total acid and metal recovery.
- High purity de-ionized water production with Eco-Tec water de-ionization unit.

**Canada**

## **Strategic partnerships**

### **Gendron Lefebvre**

2 Place Laval  
Laval, Quebec  
H7M 5N6

Telephone: (514) 384-1260  
Facsimile: (514) 629-8737

Claude F. Lefebvre, President  
Marc A. Gendron, Managing Director

### **Major products/services**

- **Environmental engineering services**

**Wastewater treatment**

**Water treatment**

Gendron Lefebvre provides environmental engineering services in the areas of municipal and industrial water and wastewater treatment. Other services concern numerical mapping, electrical and mechanical engineering, surveying and land development.

### **Desired alliance with other firms**

Technology transfer agreements and technology distribution agreements.

### **Company history**

Gendron Lefebvre is a wholly Canadian-owned company which was founded in 1958.

- Sales: More than \$10 million
- R&D expenditures: \$1,0 - \$1,5 million
- Employees: 300
  - Research and development: 9
  - Marketing: 3
- Current markets operating in:  
Canada, United States, Africa, Asia and abroad (Madagascar, Burundi, China, Turkey)

### **Technological expertise**

- Wastewater treatment: biological treatment, especially biological filters, expert systems and sludge dewatering as applied to municipal and industrial wastewaters (pulp and paper, mining, food processing).
- Urban drainage: combined sewer overflow control, expert systems.
- Potable water treatment: activated carbon biological treatment, new clarification techniques.
- Research and development: new dewatering technologies for municipal and industrial sludges, BAC filtration, treatability studies, biological filters.

# ***Gendron Lefebvre***

(continued)

## **Products developed**

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- Visual support for network analysis
- Expert systems for plant and network control
- Technology transfer

**Canada**

## **Strategic partnerships**

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### **Gore & Storrie Limited**

255 Consumers Road  
North York, Ontario  
M2J 5B6

Telephone: (416) 499-9000  
Facsimile: (416) 499-4687

Robert A. Goodings, President

### **Major products/services**

---

- **Environmental engineering consulting**

The firm has unique capabilities and experience in water and wastewater treatment, water supply systems, sewerage and storm drainage systems, water resources, air pollution, hazardous waste management, solid waste management, energy management and environmental planning.

### **Desired alliance with other firms**

---

In association, would supply industrial water and wastewater process and management expertise.

### **Company history**

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Gore & Storrie Limited has specialized exclusively in the environmental engineering field since it was founded in 1919. G&S has designed a substantial number of Canadian water treatment systems, sewage schemes and wastewater treatment plants. Many of these projects are in the Great Lakes Region where the firm has achieved a reputation for cost effectiveness and reliability. The firm has successfully completed major industrial pollution abatement, solid and hazardous waste management, sludge incineration and energy recovery projects.

- Sales: Greater than \$30 million
- Employees: More than 400 staff
- Current markets operating in:  
Canada, United States, England, France and Holland

(continued)

# **Gore & Storrie Limited**

(continued)

## **Technological expertise**

In Canada and abroad, Gore & Storrie Limited is renowned for its innovative process and design capabilities for water, wastewater and other projects. G&S has several national awards for its water and wastewater treatment facility designs including the 1986 Governor General's Award — Canada's top consulting engineering honour — for its patented hybrid anaerobic (HYAN) treatment process. This process treats high-strength industrial wastes while generating significant amounts of fuel gas. Recent international assignments include industrial waste treatment design projects in the United States, England, France and Holland as well as municipal water treatment projects in the United States and Tanzania.

Recently a pilot plant MSG wastewater treatment study utilizing the HYAN process was successfully completed in Shanghai, China. Other award-winning projects have been North America's first major underground water treatment plant and a closed-loop sludge destruction system that produces excess available energy from municipal and industrial sludges.

The G&S Research Centre was created to respond to our clients' needs to meet the increasingly stringent government regulation of industrial and municipal effluents and potable water quality. It will augment the firm's traditional services with the addition of physical and chemical analyses of surface and groundwater, wastewater and soil samples, laboratory and pilot process studies, monitoring programs, quality assessment and quality control, and data interpretation capabilities. The building houses an analytical laboratory as well as water and wastewater process research and development areas. Analytical capabilities include identification of conventional pollutants in water and soils. Current activities in research and development work include:

### **Wastewater**

- Chemical selection and optimization of physical/chemical treatment processes.
- Bench scale biodegradability testing, both aerobic and anaerobic.
- Pilot scale treatability testing.
- Bench scale sludge thickening and dewatering testing.
- Dissolved air floatation testing.

### **Water**

- Bench and pilot scale ozone treatability studies.
- Bench and pilot scale slow sand filtration tests.
- Activated carbon removal of organics including taste and odours.
- Alternative disinfection techniques for trihalomethane control.
- Optimization of coagulation, flocculation and filtration processes.

**Canada**

## **Strategic partnerships**

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### **John Meunier Inc.**

6290 Perinault  
Montreal, Quebec  
H4K 1K5

Telephone: (514) 334-7230  
Facsimile: (514) 334-5070

Gabriel Meunier, President

### **Major products/services**

---

- **Screens: CONT-FLO, ROTARC, SOS, VO**
- **Screening ompactor: ROTOPAC**
- **Grit chamber: MECTAN, SAM**
- **Storm flow management: Hydrovex product line**

### **Desired alliance with other firms**

---

Open to different types of associations.

### **Company history**

---

John Meunier founded the company in 1948 on the basis of 25 years of professional experience in water hydraulics and filtration.

- Current markets operating in: Canada and the United States

### **Technological expertise**

---

- Provision of wastewater treatment process equipment.
- Storm flow management: Hydrovex products for use in combined sewer regulation and control, sanitary flow interception, storm water mangement and flood control applications.

### **Products developed**

---

Flow limitors: Model BV Vortex Valve TTT (thistle tube thrattle)

Sediment control: SFT (sediment flushing tank)

Overflow water level contraller: ARS (air regulated siphon)

Canada

## Strategic partnerships

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### Kenox Corporation

Suite 107, 250 Consumers Road  
North York, Ontario  
M2J 4V6

Telephone: (416) 756-4888  
Facsimile: (416) 756-4889

R.P. McCorquodale, Technology Officer  
L.J. vanMonsjou, Joint Venture/Licensing Officer  
J.B. Stott, Marketing/Sales Officer

### Major products/services

---

- **Treatment of liquid organic wastes**

Development and marketing of patented process for treatment of liquid complex organic wastes.

### Desired alliance with other firms

---

The company seeks joint ventures or exclusive licensing arrangements with major strategic partners in order to introduce technology worldwide.

### Company history

---

The company is wholly Canadian-owned and was incorporated in Ontario in 1983.

- Sales: In 1989 were less than \$1 million; estimated sales in 1990 are less than \$5 million
- Employees: 4 (plus associates as required)  
Active in research and development and marketing
- Current markets operating in: No restrictions (world rights)

### Technological expertise

---

Patented wet air oxidation technology.

### Products developed

---

Turnkey treatment plants with a through-put capacity from 0.5 L/s to more than 8 L/s, i.e., designed, fabricated, turnkeyed and operated a full-scale plant which successfully treats complex (hazardous/toxic) liquid organic wastes from a large drum reconditioning facility.

### Products in development

---

Modifications to main process for adaptation to specialty wastes (sludges/semi-solids).

**Canada**

## **Strategic partnerships**

### **Laidlaw Inc.**

3221 North Service Road  
P.O.Box 5028  
Burlington, Ontario  
L7R 3Y8

Telephone: (416) 336-1800  
Fax: (416) 332-9374

Donald K. Jackson, President and CEO

### **Major products/services**

Under the name Laidlaw Environmental Services, Laidlaw operates commercial wastewater treatment facilities, secure chemical landfills, incinerators, physical-chemical treatment facilities, fuel blending operations, waste transfer station and waste bulking. The company also specializes in providing services for the small waste quantity generator (e.g. spent acid removal from electroplating operations), and the packaging and disposal of residual chemicals from laboratory operations.

### **Desired alliance with other firms**

Laidlaw Environmental Services seeks partners to develop liaisons and joint ventures.

### **Company history**

Laidlaw Inc. was founded in 1959, and has grown to become North America's second largest hazardous waste company and third largest solid waste company. The company operates from 48 locations in North America. Laidlaw Environmental Services was established in 1990.

- Sales: \$1,4 billion
- Employees: 35 000
  - Research and development: Greater than 10
  - Sales and marketing: Greater than 500
- Current markets operating in: Canada, United States

### **Technological expertise**

Laidlaw's expertise concerns the application of technologies to the treatment and disposal of industrial and hazardous wastes. Laidlaw has experience in the design, construction and operation of commercial waste management facilities. This is coupled with extensive experience in environmental impact studies and environmental assessment of facilities.

### **Services offered**

Laidlaw offers services in the operation of commercial waste management facilities.

Canada

## ***Strategic partnerships***

### ***M.M. Dillon Ltd.***

M.M. Dillon Limited (International Division)  
Suite 401, 150 Kent Street  
Ottawa, Ontario  
Canada K1P 5P4

Telephone: (613) 238-6423  
Fax: (613) 237-7190

James H. Keamey, P.Eng., President  
Charles J. Kretch, P.Eng., Deputy Director/International Operations

### **Major services**

- ***Aerobic and anaerobic biological treatment technology and physical-chemical treatment technology for water reuse and wastewater treatment***
- ***Laboratory testing, bench scale analyses, pilot scale testing of processing equipment, design studies and final engineering design***
- ***Studies to evaluate options such as in-plant volume or concentration reduction and alternative treatment, disposal or reuse strategies***

### **Desired alliance with other firms**

Joint ventures or association arrangements to assess new markets in environmentally sensitive geographical areas.

### **Company history**

Dillon is a wholly Canadian-owned company. Starting with a single office in 1945, the company now has 10 offices across Canada and is working internationally in Mexico, the Caribbean and throughout Asia.

- Sales: Greater than \$10 million
- R&D expenditure: \$100 000 to \$200 000
- Employees: 460  
    Research and development: 10  
    Marketing: 13

Current markets operating in:

Canada, United States, Mexico, Caribbean, Indonesia, Thailand, Philippines and China.

## **M.M. Dillon Ltd.**

(continued)

### **Technological expertise**

---

- Dillon offers a broad range of specialized wastewater treatment experience and expertise in providing effective and reliable solutions to waste management problems. Sensitivity to client requirements is an integral component of our services. Dillon has developed innovative solutions for treating wastewaters from automotive, petro-chemical, food processing, mining, manufacturing, brewery, soft drink and biomedical facilities.
- Typical process designs include aerated lagoons, biological contactors, anaerobic biological treatment, physical-chemical treatment, carbon adsorption, air flotation, sludge dewatering, air pollution abatement, leachate treatment and hazardous waste disposal.
- Dillon carried out the process development, design and contract administration (including assistance with commissioning) for the first full-scale landfill leachate treatment facility in Canada. This design was the recipient of two awards.
- Dillon offers a full range of environmental engineering services including the following:
  - waste audits, wastewater characterization, development of processing schemes, equipment sizing and selection, cost comparison and evaluation, detailed facility design, assessment of regulatory compliance, contract administration, construction, installation and commissioning services.

**Canada**

## **Strategic partnerships**

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### **Microbe Inc.**

85 Midpark Road  
London, Ontario  
N6N 1B2

Telephone: (519) 668-1005  
Facsimile: (519) 668-3188

Dr. J.P. Insell, Vice-President of Commercialization & Development

### **Major products/services**

---

- **Pollutant-specific bacterial cultures**  
*(research, development and marketing)*
- **Analytic services**
- **Wastewater treatment systems design**
- **Plant tissue culture research**  
*(chemical and microbial analyses)*

### **Desired alliance with other firms**

---

Both research and commercial partnerships are sought.

### **Company history**

---

A Canadian company formed in 1983, Microbe Inc. is a wholly owned subsidiary of Microbe Corporation of London, Ontario.

- Sales: Less than \$1 million
- Employees: 15  
Research and development: 7

### **Technological expertise**

---

Natural (non-genetically engineered) bacteria are enhanced by proprietary methods to more effectively degrade pollutants found in solids (bio-remediation), wastewaters and to attack target pests (biopesticides).

### **Products developed**

---

Customized bacterial cultures are manufactured and sold.

### **Products in development**

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Plant tissue-culture research.

**Canada**

## **Strategic partnerships**

### **Monenco Ltd.**

180 Attwell Drive, Suite 400  
Rexdale, Ontario  
M9W 6A9

Telephone: (416)798-0111  
Facsimile: (416)798-0130

A.J. Birchenough, President  
W.H. Stiebel, V.P. - Environmental Eastern  
L.A. Panek, V.P. - Environmental Western

### **Major products/services**

- **Wastewater treatment**
- **Hazardous waste management**
- **Waste management**
  - Air pollution control**
- **Hydrogeology**
- **Industrial site decommissioning/cleanup**

Monenco provides consultancy services in most aspects of engineering and integrated project management, including research, study, design, development and implementation of large and small projects throughout the world. Monenco is active in the environmental, industrial, power, oil and gas and mining fields. It has specific expertise in wastewater treatment, hazardous waste management, waste management, including air pollution control and hydrogeology. The research and development program currently involves oil field produced wastewater treatment, contaminated soils technology development, and model systems development for waste management.

### **Desired alliance with other firms**

Joint ventures or associations on a project-by-project basis.

### **Company history**

Monenco Consultants was founded in 1907 as Montreal Engineering Company Ltd. It is wholly owned by Monenco Ltd., a public company, 67% of its shares being held by Canadian public shareholders. The major shareholder is Majestic Contractors Limited. Monenco Consultants Limited is one of 27 subsidiary and associate companies in Canada, the United States and abroad that comprise the Monenco Group.

- Sales: More than \$100 million
- Employees: 1 900
- Current markets operating in:
  - Public and private, governments and lending agencies in over 70 countries

(continued)

# **Monenco Ltd.**

(continued)

## **Technological expertise**

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Monenco is well experienced in engineering of industrial water, wastewater and emulsion treatment systems; plant cooling water systems; heavy oil produced water treatment; site water drainage and water treatment for re-use in steam generation.

Monenco also specializes in the design of groundwater containment, and pump and treatment systems for the recovery of hydrocarbon products and the removal of dissolved chemicals.

## **Products in development**

---

Monenco undertakes R&D for its clients as an integral part of projects. An example is a current research program aimed at treating oilfield-produced water by reducing hardness and silico for re-use as Enhanced Oil Recovery boiler feed water.

A new research program is directed at the removal of organic chemicals from soil using enhanced oxidation processes.

Canada

## **Strategic partnerships**

### **NovaTec Consultants Inc.**

40 Powell Street, Suite 300  
Vancouver, British Columbia  
V6A 1E7

Telephone: (604) 682-8777  
Facsimile: (604) 682-3521

W.F. Hyslop, Ph.D., President  
G.J. Bull, M.Eng., P.Eng., Principal  
O. Turk, Ph.D., P.Eng., Principal  
I.F. Van Bastelaere, P.Eng., Principal  
T.D. Vassos, Ph.D., P.Eng., Principal

### **Major products/services**

- *Pulp and paper wastewater treatability studies*
- *Meat/fish processing plant wastewater treatment studies and system design*
- *Oil refinery/gas plant wastewater treatment studies and system design*
- *Hazardous waste management*
- *Process design for biological nutrient removal*
- *Pilot plant operation*
- *Outfall and ground disposal design*

NovaTec Consultants supply specialist consulting services to other consulting firms and government agencies. Specialists have advanced degrees:

Ph.D. s – (2) Environmental Engineering, (1) Chemistry  
(1) Chemical/Biochemical Engineering  
Masters – (4) Environmental Engineering

### **Desired alliance with other firms**

Other firms with detailed design expertise, but lacking process capabilities in advanced wastewater treatment.

### **Company history**

The company is wholly Canadian-owned and was started in December 1984. There are two offices in British Columbia, Vancouver and Victoria.

- Sales: Less than \$5 million
- R&D expenditure: \$50 000
- Employees: 26
  - Research and development: 2
  - Marketing: 1
- Current markets operating in:
  - Europe (Denmark, Sweden, West Germany), United States (Montana)

(continued)

# **Novatec Consultants Inc.**

(continued)

## **Technological expertise**

---

- Process design for biological treatment systems for municipal and industrial wastewaters.
- Design of water treatment systems for municipal and industrial applications.
- Effluent disposal design including marine outfalls, complex ground disposal and land applications systems.
- Advanced treatment technology design for pulp and paper wastewaters.

## **Products in development**

---

Expert system applications for wastewater treatment plant operator training and process modelling.

Process troubleshooting, instrumentation applications for plant retrofits.

Canada

## **Strategic partnerships**

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### **Pollutech Environmental Limited**

768 Westgate Road  
Ookville, Ontario  
L6L 5N2

Telephone: (416) 847-0065  
Fax: (416) 847-3840

President: Richard V. Loughton

### **Major products/services**

---

- *Process evaluations*
- *Testing laboratories*  
*Chemical, biological*
- *Natural science services*
- *Workplace testing*
- *Corporate consulting*

### **Desired alliance with other firms**

---

Design consultants.

### **Company history**

---

Pollutech Environmental Limited is a wholly owned subsidiary of the Canadian firm Loughton Development Corporation.

- Sales: \$1 to 5 million
- Employees: 22
- Current markets operating in:  
China, Spain, West Germany

### **Technological expertise**

---

Process evaluations for tertiary treatment, morine testing, florine control.

(continued)

# **Pollutech Environmental Limited**

(continued)

## **Products developed**

---

- Corporate services: plant audits, property transfer evaluations, decommissioning studies, environmental risk assessments, corporate consulting and advisory services.
- Process evaluations: effluent treatment, water treatment, atmospheric discharges, hazardous industrial wastes, waste recovery and utilization.
- Testing facilities: laboratory services, bench scale testing, pilot plant evaluations, analytical services, toxicity testing, Great Lakes testing facility.
- Workplace environmental services: indoor air quality assessments, industrial hygiene and occupational health, employee training programs.

## **Products in development**

---

Confidential. Client information.

Canada

## **Strategic partnerships**

### **Proctor & Redfern Limited**

45 Green Belt Drive  
Don Mills, Ontario  
Canada M3C 3K3

Telephone: (416) 445-3600  
Fax: (416) 445-5276

Stuart G. Angus, P. Eng., President  
Frank C. Moir, P. Eng., Vice-President

### **Major products/services**

- **Environmental Engineering Consulting**

This firm of consulting engineers, architects, planners and environmental scientists provides services in the fields of water and wastewater treatment, waste management, urban development and transportation.

### **Desired alliance with other firms**

Proctor & Redfern Limited seeks to develop alliances with major strategic partners in order to extract information, develop applications and introduce them to the North American marketplace.

### **Company history**

Established in 1912, Proctor & Redfern Limited is one of Canada's oldest consulting engineering firms. It is a Canadian firm, wholly owned by employees. The firm consists of approximately 700 staff, of which some 300 have professional status. Proctor & Redfern operates from 14 offices in Ontario and an office in St. John's, Newfoundland. There is an affiliate in Florida, United States.

- Sales: More than 10 million
- R & D expenditure: \$100 000
  - Employees: 700
  - Research and development: 12
  - Marketing: 1
- Current markets operating in:
  - Canada, United States, Bermuda, Caribbean

(continued)

# **Proctor and Redfern Limited**

(continued)

## **Technological expertise**

---

- Industrial/municipal water and wastewater treatment plant design, process optimization and operation, process audits. All scales of operation from 10 m<sup>3</sup> to 545 000 m<sup>3</sup>/day.
- Industrial pollution abatement using the concepts of reduction, re-use and recycling.
- Support to industries to aid in reduction of discharges to receiving waterbeds.
- Environmental impact studies and water quality assessment.
- Municipal sewer use by-law implementation and enforcement.
- Hazardous waste cleanups, site audits, inspections and remediations.
- Environmental assessment and approvals.
- Analytical services
- Sludge management and disposal including incineration.

## **Products developed**

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- Feasibility studies, project management, contract preparation/administration, evidence and expert testimony, field services, investigations and reports, preliminary design/concepts, advisory services, tender call and review, liaison with approval authorities, detailed design, and construction management.
- Development of the Proctor & Redfern Proportional Sampler for precisely determining the levels of consumption of metals in drinking water at any point in the distribution system.
- Development of Automated Breakline Technology software which greatly increases the reliability and addressability of computerized terrain modelling.
- Innovative computer software programs to optimize and modify wastewater treatment process trains and to update cost benefit analyses of various unit operators.

Canada

## **Strategic partnerships**

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### **R.V. Anderson Associates Limited**

1210 Sheppard Avenue East  
Willowdale, Ontario  
M2K 1E3

Telephone: (416) 497-8600  
Facsimile: (416) 497-0342

Kenneth Morrison, President

### **Major products/services**

---

- **Environmental services**
  - Pollution abatement and planning**
  - Environmental audits**
  - Environmental assessments**
  - Privatization**
  - Wastewater and water treatment facilities and contract operations**

Consulting engineering services have been provided to government agencies and to the private sector for over 40 years.

### **Desired alliance with other firms**

---

Through joint venture arrangements, other firms can bring to an alliance, skills related to total project delivery. This would allow sharing of project risks and rewards for a diversified approach.

### **Company history**

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The company was founded in 1948, incorporated by Ontario Charter in 1951 as R.V. Anderson and Associates Limited and changed 1964 to R.V. Anderson Associates Limited. The firm is wholly owned by its Canadian practising principals. In 1988, Dennis Consultants Limited of Sudbury was merged with RVA to expand the firm's service area.

- Sales: More than \$10 million
- R&D expenditure: \$250 000
- Employees: 160 (consulting)
- Current markets operating in:
  - Geographic market areas are currently in Eastern Canada and selected offshore projects: Indonesia, Saudi Arabia, Argentina, United Kingdom, Brazil and United States

(continued)

# **R.V. Anderson Associates Limited**

(continued)

## **Technological expertise**

---

Environmental planning, water pollution control, water supply, water resources, municipal services, structural engineering, architecture, tunnels, transportation, land development.

## **Products developed**

---

Total project delivery for environmental projects including some or all of the following: feasibility study, planning, design, build, own and operate wastewater facilities.

Canada

## Strategic partnerships

### Solarchem Environmental Systems

40 West Wilmot Street  
Richmond Hill, Ontario  
L4B 1H8

Telephone: (416) 764-9666  
Facsimile: (416) 764-9669

Dr. R.D. Samuel Stevens, President  
P.W. Smith, Vice President, Marketing and Sales

### Major products/services

- **RAYOX second generation enhanced oxidation water decontamination systems**

Manufacture, installation and operation of RAYOX second generation enhanced oxidation water decontamination systems.

### Desired alliance with other firms

Qualified applications/contacts for RAYOX with end users, or sales to such a firm if they are in the remediation business (e.g. clean-up of groundwater or the provision of water remediation with a transportable facility). Territoriality or field of use limited licences are possible as well as joint ventures.

### Company history

Brolor Investments Ltd.  
(Holding company of the Lorrimer family of Ontario)  
Ontario Development Corp  
Domtar Inc.  
Management

- Sales: Less than \$5 million
- R&D expenditure: \$500 000
- Employees: 25  
R&D, manufacturing and marketing
- Current markets operating in: Canada, United States

### Technological expertise

Solarchem has developed second generation enhanced oxidation processes for the remediation of contaminated water, air and soil. The soil remediation process could also be used for on-site destruction of high/strength PCBs. The water clean-up process (RAYOX) is being used to clean up groundwater and process wastewater containing a wide range of contaminants such as explosive compounds (TNT, NG, EGDN, RDX, etc.), chlorinated hydrocarbons (TCE, PCE, DCE, TCA, DCA, CC14, PCBs); Phenols (resorcinol, creosol, TCP, PCP); gasoline (B,E,T,X, TPH); Nitrosamines (DMNA, MMNA); Cyanides (fixed and free); PAH, pesticides.

(continued)

# **Solarchem Environmental Systems**

(continued)

## **Products developed**

---

Design, manufacture, installation and operation of full-scale RAYOX systems for the remediation of contaminated process or groundwater.

On-site or laboratory pilot scale treatability/design studies.

## **Products in development**

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Solvinox: Process for remediation of contaminated soils (e.g. PCB) or on-site destruction of high-strength PCB.

Deodair - Second generation enhanced oxidation process for the decontamination of high volume, low concentration exhaust air streams. Process is especially cost-effective for exhaust streams with less than 100 ppm of VOC or other contaminant. Technology at advanced development stage - a 1 000 L/s technology improvement program underway jointly with the University of Toronto.

Canada

## Strategic partnerships

---

### SNC/EnerSludge

2 Place Felix Martin  
Montreal, Quebec  
H2Z 1Z3

Telephone: (514) 866-1000  
Facsimile: (514) 866-0795/1549

Alain Perez, President  
Gilles Fournier, Vice-President Environment & Public Works

### Major products/services

---

- "Oil from sludge" technology
- Multistage anaerobic reactors

Engineering, procurement and construction in the chemical and petroleum, hydroelectrical, mining and metallurgy, municipal and environmental areas.

### Desired alliance with other firms

---

Joint venture with local firm to undertake wastewater projects where "oil from sludge" and multistage anaerobic reactor could be sold and installed.

### Company history

---

Founded in 1911, SNC has provided engineering, procurement and construction services, and since then the company has joined the Montreal and Toronto stock exchanges. SNC commercializes EnerSludge technology to transform municipal sludge into oil.

- Sales: More than \$10 million
- R&D expenditure: \$2 million
- Employees: 4 600
  - Research and development: 30
  - Manufacturing: 1 800
  - Marketing: 40
- Current markets operating in:  
Canada, United States, Tunisia, Morocco, India

### Technological expertise

---

- Transformation of municipal sludge into oil.
- High-rate anaerobic digestion.
- Engineering and construction.
- Control and communication systems.

(continued)

# **SNC EnerSludge**

(continued)

## **Products developed**

---

- Removal of heavy metal from contaminated soils
- Spectroscopy for pollution assessment and control
- Geomatic applied to environment

Canada

## **Strategic partnerships**

---

### **Trojan Technologies Inc.**

845 Consortium Court  
London, Ontario  
N6E 2S8

Telephone: (519) 685-6660  
Facsimile: (519) 681-8355

H.J. Vander Laan, President

### **Major products/services**

---

- **Ultraviolet disinfection systems**
  - Municipal*
  - Industrial*
  - Residential applications*

### **Desired alliance with other firms**

---

Marketing expertise in local market.

### **Company history**

---

Founded in 1977, the company is a privately held, wholly Canadian-owned company.

- Sales: Less than \$10 million
- R&D Expenditure: \$0,5 million
- Employees: 45
  - Research and development: 6
  - Manufacturing: 35
  - Marketing: 4
- Current markets operating in:
  - Canada, United States, Australia, New Zealand, West Germany, Holland, United Kingdom, Italy, Mexico, Norway and Singapore

### **Technological expertise**

---

Ultraviolet disinfection.

### **Products developed**

---

Have developed in-house a complete range of ultraviolet disinfection units.

### **Products in development**

---

Photo-chemical oxidation systems.

**Canada**

## **Strategic partnerships**

---

### **Zenon Environmental Inc.**

845 Harrington Court  
Burlington, Ontario  
L7N 3P3

Telephone: (416) 639-6320  
Facsimile: (416) 639-1812

Dr. Andrew Benedek, CEO  
John A. Coburn, President

### **Major products/services**

---

- **Reverse osmosis and ultrafiltration membranes and systems for water purification**
- **Instrumentation for optimizing sludge dewatering**
- **Environmental process engineering**
- **Environmental chemical analysis**

### **Desired alliance with other firms**

---

Seeking partners to distribute Zenon products. Also interested in joint venture opportunities for environmental laboratory and engineering services.

### **Company history**

---

Zenon Environmental Inc. began operation in 1980 under Dr. Andrew Benedek, then a professor of chemical engineering at McMaster University. The Company structure was designed to provide solutions to the world's water problems and rapidly became well known for exceptional capabilities in the field of trace organic analysis and specialized analytical methods development. As Zenon's emphasis has shifted to industrial monitoring, its reputation as a quality leader continues to be enhanced.

- Sales: More than \$25 million
- R&D expenditure: More than \$2 million
- Employees: 220  
R&D, manufacturing and marketing
- Current markets operating in: Canada, United States, Japan, Australia, Hong Kong, South Korea, Holland, France and Greece

### **Technological expertise**

---

Specialized organic analysis (i.e. dioxins), membranes for oily waste, coloured water, metallic wastes, etc., instrumentation for sludge conditioning.

(continued)

## ***Zenon Environmental Inc.***

(continued)

### **Products developed**

---

Specialized ultrafiltration/reverse osmosis systems for each market application listed previously.  
Sludge conditioning controller.

Canada

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**Institut National  
de la Recherche  
Scientifique - Eau**

2800, rue Einstein, suite 105  
Quebec, Quebec  
G1X 4N8

Telephone: (418) 654-2532  
Fax: (418) 654-2600

Jean-Pierre Villeneuve, Managing Director

**Strategic partnerships**

---

**Major products/services**

- **Pollutant biogeochemistry**
- **Pollutant ecotoxicology**
- **Nutrient dynamics**
- **Hydrological modelling**
- **Water resources**  
*Statistical and numerical analysis*

INRS is involved in research and development in the water sciences.

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**Desired alliance with other firms**

Joint venture and partnership.

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**Company history**

The INRS centre was created in 1970 and now has 16 professors, 6 associates, 13 research assistants and 10 technical and office staff. There are 60 students pursuing master and doctoral studies. The budget is \$6 million, of which \$3,5 is from contracts and grants.

- R&D expenditure: \$6 million
- Employees: 85 (research)
- Current markets operating in:  
Canada, Switzerland, France, Mali, Morocco, Argentina, Mexico

---

**Technological expertise**

Optimization, modelling, organic groundwater pollution, expert systems, GIS, finite elements, nutrient speciation, statistical analyses, heavy metal behaviour, treatment processes of sewer overflows, control and optimization, digital image processing, acid rain impacts, snow melt and geochemistry of sediment.

(continued)

# **Institut National de la Recherche Scientifique - Eau**

(continued)

## **Products developed**

---

Environmental software, online management control, analytical chemistry analyses, partnership with consulting firms and related services. Formatting and teaching in environmental sciences.

## **Products in development**

---

Online control of sewer overflows, hydrodynamic modelling of the St. Lawrence river, real-time control of reservoir, river water quality modelling.

Canada

## **Strategic partnerships**

---

### **Ontario Waste Management Corp. (OWMC)**

2 Bloor Street West, 11th Floor  
Toronto, Ontario  
M4W 3E2

Telephone: (416) 923-2918  
Facsimile: (416) 923-7521

Dr. D.A. Chant, President

### **Major products/services**

---

- *Waste management technical assistance to industry*
- *Laboratory services*
- *Waste audit training and seminars*
- *Site remediation assistance*

Proposed 300 000 t/a hazardous and liquid industrial waste treatment and disposal facility, waste reduction assistance to industry.

### **Desired alliance with other firms**

---

Novel technologies for waste minimization/management.

### **Company history**

---

The Company is an Ontario provincial Crown corporation with a mandate to develop and operate facilities for the treatment and disposal of all types of hazardous and liquid industrial waste generated in Ontario.

- Employees: 68
- Employed in operations: 26
  - Administration and finance: 14
  - Marketing: 16
  - Communications: 1
- Current markets operating in:
  - Ontario hazardous and liquid industrial waste management market

### **Technological expertise**

---

Proposed facility to include rotary kiln incineration, physical/chemical treatment, solidification and secure landfill of treatment residues.

Canada

## **Strategic partnerships**

### **Ortech International**

2395 Speakman Drive  
Mississauga, Ontario  
L5K 1B3

Telephone: (416) 822-4111  
Facsimile: (416) 823-1446

Robert Bowen, Marketing Manager

### **Major products/services**

- **Environmental research and development**

**Chemical**

**Automotive**

**Resource**

**General manufacturing sectors**

Contract R&D related to environmental protection in the chemical, automotive, resource and general manufacturing sectors. The company does treatability studies on waste streams using pilot, bench and full-scale systems, and provides development services for waste treatment equipment and instrumentation.

### **Desired alliance with other firms**

We are initially interested in a sub-consulting role (exclusive, if preferred) providing our development expertise for treatment and management of complex wastewater systems.

### **Company history**

Since 1928, the company has provided R&D services to Ontario manufacturing firms. During the last 10 years, the company has expanded into the United States (15% revenues). The number of environmental clients is increasing, making up 50% of business, and this sector continues to grow.

- Sales: More than \$30 million
- R&D expenditure: \$1 million
- Employees: 400  
Marketing: 10
- Current markets operating in:  
United States, Canada

### **Technological expertise**

Broad range of environmental technologies in air and water pollution control: wet air oxidation, cyanide destruction, point-of-use water filtration, chemical analysis, aerobic and anaerobic treatment, mining waste treatment and advanced oxidation.

(continued)

# ***Ortech International***

(continued)

## **Products in development**

---

- Application of aerobic and anaerobic treatment systems for landfill leachate.
- Application of chlorine dioxide for disinfecting wastewater effluents.

**Canada**

## **Strategic partnerships**

### **Waterloo Centre for Process Development (WCPD)**

#### **University of Waterloo**

Waterloo, Ontario  
N2L 3G1

Telephone: (519) 888-4058  
Facsimile: (519) 888-6179

E.B. Cross, Executive Director

### **Major products/services**

- **Wastewater treatment technology licences**

Eighteen licences with industries in Canada, United States, United Kingdom, Sweden. Ideally technology is exclusively licensed to North American firms who have the capability to effectively conduct offshore sales and marketing activities.

### **Desired alliance with other firms**

Joint development research contracts directly with either WCPD or licensee companies of the WCPD.

### **Company history**

The WCPD has operated for 11 years within the University of Waterloo's Department of Chemical Engineering. The WCPD's mission is to identify, protect, develop and license technologies emerging from the academic research programs to the industrial sector for full commercialization. Royalties earned are shared with the inventors and the University, with the University portion directed to continued development activities.

- Sales: Less than \$5 million
- R&D expenditure: \$2 million
- Employees: as many as 40
  - Research and development: 38
  - Administration: 2
- Current markets operating in:
  - Canada, United States, United Kingdom, Sweden, Mexico, France, Yugoslavia, China and Thailand

### **Technological expertise**

- Unit processes for industrial wastewater management
- Air pollution control technology: scrubbers
- Improved zinc roasting processes to reduce waste handling

(continued)

# **Waterloo Centre for Process Development (WCPD)**

(continued)

## **Products developed**

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- Device for low-cost improvement to existing sedimentation tanks
- Dust removal air scrubbers
- Improved zinc roasting processes to reduce waste handling

## **Products in development**

---

Dry model of dust removal air scrubber at the demonstration stage.

Turbulent Flow Agglomeration Filter (Dry) for the collection of fine dust particles in exhaust gases.

Canada

## **Strategic partnerships**

### **Wastewater Technology Centre (WTC)**

867 Lakeshore Road, Box 5050  
Burlington, Ontario  
L7R 4A6

Telephone: (416) 336-4588  
Facsimile: (416) 336-4765

Dr. B.E. Jank, Director  
Beverly Pasion, Technology Transfer

### **Major products/services**

- **Environmental protection technologies**
  - Water pollution control**
  - Waste management**

The WTC undertakes research and development of environmental protection technologies in areas related to water pollution control and waste management. It also serves in an advisory capacity to various levels of government with regard to the technological basis for regulatory control of contaminants emanating from wastewaters and their associated residues.

### **Desired alliance with other firms**

New alliances concerning marketing of new products as they are developed.

### **Company history**

Established in 1972 as a federal government research laboratory. At the WTC, processes and technologies for treating wastewater and sludge are developed. The Centre's unique facilities are often utilized by industry, provincial agencies and municipalities to deal with particularly difficult and costly water pollution problems. As well, WTC cooperates with the private sector to refine and demonstrate technologies that appear to have commercial promise.

- R&D expenditure: Up to \$10 million
- Employees: Approximately 50 plus up to 150 assoc. contractors
- Research and development: 80% R&D and related activities
- Current markets operating in: United States, Europe, Pacific Rim countries

The WTC is the foremost facility for water pollution control research in Canada and provides the focal point for water pollution control technology in Canada's international trade and negotiations.

(continued)

# **Wastewater Technology Centre (WTC)**

(continued)

## **Technological expertise**

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The WTC consists of three research and three support divisions:

1. Biological processes
2. Physical/chemical processes
3. Residue management
4. Laboratory services
5. Computing and information
6. Support services

Scientists, engineers and various support staff in these divisions have unique research facilities consisting of a wide variety of wastewater and sludge treatment pilot plants, laboratories and offices. Emphasis is placed on developing bench scale and pilot scale processes utilizing industrial wastewaters, municipal and industrial sludges and other contaminated materials. Mobile pilot scale process units and laboratories are employed to facilitate field projects and demonstrations at locations across Canada.

Expert systems developed for the selection of treatment methodologies and in-plant process optimization is another important component; such systems offer tremendous potential for maximizing processing cost-efficiency while maintaining environmental quality control.

The area of advanced industrial materials development is also important for waste control and treatment; potential applications include landfill liners, waste stabilization and new types of membranes and coagulants for physical/chemical wastewater treatment.

Gold mill design expert system; membrane applications; liner technology; others

## **Products developed**

---

Examples of products developed include:

- Oil-from-sludge technology
- Sludge conditioning controller
- Process audit technology
- Soil remediation criteria expert system (AERIS)

Services offered include advice in providing sampling protocols, data interpretation and quality assurance, and research is undertaken on analytical methods and enhanced sampling techniques.

## **Products in development**

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Biotechnology is the focus of much of the research and technology development currently being undertaken at the Wastewater Technology Centre.

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