LE FLEUVE

St. Lawrence Action Plan Newsletter

Volume 1, nº 2, March 1990

FILE

The Joint Federal-Provincial Action Group

THE CANADIAN AND QUEBEC governments have taken up a formidable challenge by targeting the reduction of industrial waste in their efforts to clean up the St. Lawrence. If this monumental task is to be successfully completed, past projects and work must be integrated into a structure and operational system that allows for participation by different levels of government, a wide range of organizations and private enterprise. Moreover, action must be based on processes that have already been proven effective and on methods used elsewhere. New action strategies adapted to the cleanup program must also be formulated and agreements between several parties signed.

Eve-Lucie Bourque

Directors of the federal-provincial action group. From left to right: Pierre Terrault, Director of Operations, Robert Tétreault, Director, and Gaétan Duchesneau, Technical Director.

Step One: Profile of the 50 Target Industries

The St. Lawrence Action Plan joint action group commissioned an overview of the 50 industries considered priorities for action based on information from files held by various government departments and companies.

The overview was aimed at gathering information on industrial processes, sewer systems and wastewater, the treatment systems currently in use, the content of water purification programs covered by previously signed agreements and authorization certificates, enabling the group to gain further insight into the needs and technical difficulties inherent to waste treatment.

This inventory of industrial facilities has been completed and each of the companies profiled has validated the information. The action group now has at its disposal indispensable basic data which will soon be integrated into a sophisticated computer system.

Step Two: Effluent Characterization

The joint action group has also begun step two, namely, characterization of the effluents discharged by each of the companies targeted. At present, the operation has been completed for 11 of the companies and is under way for 13 others.

Previous effluent characterization studies did not provide all the data required on priority toxic substances. The St. Lawrence Action Plan therefore aims to characterize a much broader range of organic toxic substances such as PAHs, organochlorines, dioxins and furans.

"In fact," explains Gaétan Duchesneau, technical director for the action group, "we're basing ourselves on three lists of toxic substances, that of the United States' Environmental Protection Agency (EPA), Ontario's Municipal Industrial Strategy and the list contained in the Canadian Environmental Protection Act."

Characterization is performed by consultants on each effluent discharged by a given company. Samples are taken round the clock over a three-day period.

Environment Canada / Environnement Canada

Conservation and Protection / Conservation et Protection

Quality Control: An Ever-present Concern

The action group has adopted a very strict quality control procedure for on-site operations, namely, sampling, sample conservation and field analyses.

"The action group expects private laboratories to conduct a wide range of analyses," affirms Gaétan Duchesneau. "In the pulp and paper sector, for example, 90 parameters must be analyzed. This stringent quality control performed by the laboratories explains the difficulties encountered during the first year of operation. For certain effluent characterization studies, we had to return to the field and start all over again."

Until now, such analyses had most often been done by government laboratories. Consequently, the new management approach involving private laboratories made adaptation necessary, but everything is now running smoothly.

The characterization process is relatively long, as an ecotoxicological assessment is carried out to measure a given effluent's impact on the River. Measurements are taken on living organisms using bio-indicators, a method perfected by the St. Lawrence Centre. This approach, termed micro-toxicological, is original and enables different various of impact to be determined.

Formulation of New Waste Disposal Standards

The joint action group's mandate includes work to coordinate federal and provincial efforts by contributing to the development of new standards models for each sector and, consequently, to the implementation of new regulations.

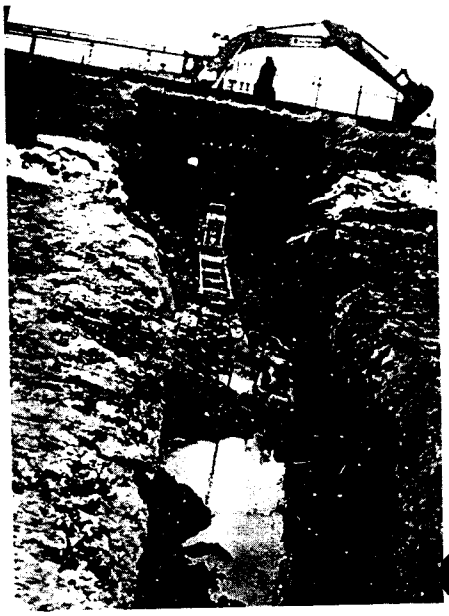
The group is currently studying a normative model for 10 industries in the aluminum smelter and metallurgy sectors which integrates the chemical and biological parameters.

"In actual fact, it's one of the main activities involved in implementing the program," states Robert Tétreault, director of the action group. "Instead of using existing standards to guide us in our work, we must develop new ones and set specific environmental objectives for each establishment."

"We are also working to develop a new economic model that will enable us to assess depollution costs," adds Gaétan Duchesneau. "The conventional economic approach consists in determining whether a company is able to assume depollution costs based on its profit margin. We, on the other hand, try to determine to what extent these costs can be shared by the company and its employees and clients, and absorbed in part by the cost of the products."

To date, 19 companies have submitted cleanup programs or agreements approved by the Ministère de l'Environnement du Québec. For example, in April 1989 the cleanup program implemented by Reynolds Aluminum Company of Canada led to the start-up of an air purification system that eliminates 90% of the HAPs produced by the anode brickets manufacturing unit.

"Two other industries also recently submitted water purification programs for approval," affirms Pierre Terrault, director of operations. The companies in question—Albright & Wilson and Alcools de commerce—are located in Varennes.



Les Produits chimiques Expro of Valleyfield, one or the 50 priority industries, is currently implementing projects involving the segregation, neutralization and treatment of wastewater.

Short-and Medium-Term Objectives

ALTHOUGH WORK is progressing well, the action group has not lost sight of its main objective, namely, to eliminate, by 1993, 90% of the toxic waste discharged into the St. Lawrence by the 50 industries identified in the St. Lawrence Action Plan.

In the short term, the effluent characterization process, which has always been carried out prior to the installation of treatment systems, must now be taken one step further to allow for verification of the waste produced following their installation.

In 1990-1991, the action group plans to complete effluent characterization and ecotoxicological assessment for 20 industries. Control samples will then be taken from 10 industries to assess the anticipated reduction for the 50 industries targeted.

The group also intends to assess the cleanup programs and agreements implemented prior to last year. The St. Lawrence Action Plan is in fact based on existent programs, namely, the Ministère de l'Environnement du Québec's water management and purification program, under which MENVIQ began its industrial cleanup efforts.

In 1992-1993, the action group will report on the reduction in toxic waste produced by the 50 industries profiled and monitor the depollution programs.

Among its other projects, the group will test the St. Lawrence modelling system developed by INRS-Eau to predict plumes and the effects of waste. The results of this study will be implemented by the St. Lawrence Centre.

With its environmental programs, the Conservation and Protection Branch for the Quebec region is Canada's leader in PAH assessment. The St. Lawrence Centre will therefore be involved in assessing projects to expand aluminum smelters in Quebec.

As Far as the United States

The depollution program will be implemented jointly with organizations from outside Quebec that have a vested interest in the St. Lawrence. Given that much of the toxic waste that ends up in the St. Lawrence River originates from the Great Lakes, the St. Lawrence Centre plans to cooperate with the heads of various depollution programs in Ontario and the United States to ensure that Quebec's needs are met. In the United States, for example, the St. Lawrence Centre will participate in the sector-based committees of the Remedial Action Plan.

Gaétan Duchesneau is fully confident that objectives will be attained. "It's an excellent opportunity," he remarks, "for the members of the action group to apply a work method based on cooperation with the various levels of government and groups involved in water purification in Quebec. Such joint action promotes the development of a partnership model that enables us to achieve greater complementarity and efficiency in working toward our objectives."

"Another interesting challenge," he adds, "consists in developing an action model specific to individual companies within each industry. In some cases, legislation is required, while in others negotiation and the signing of draft agreements are the best route. In dealing with industries, we are sometimes confronted by modernization problems. In rare cases, however, we do encounter economic problems that make closing down the plant a possibility."

"Stakes are high," concludes Duchesneau, "because although the environment is a vital factor, substantial investments must also be taken into account."

Unified Action by a Single Group

The main objective of the St. Lawrence Action Plan is to eliminate, by 1993, 90% of the volume of liquid toxic waste discharged into the St. Lawrence by the 50 industries identified as the biggest polluters.

In June 1989, the federal-provincial action group was set up to perform field work. The team is composed of 25 individuals experienced in depollution techniques who were recruited from the ranks of federal and provincial (MENVIQ) government departments and private enterprise. Robert Tétreault, director of MENVIQ's industrial water purification program, was chosen to head the team, whose mandate expires in 1993.

Under the terms of the agreement and to ensure unified action, the specialists involved in existent programs, in particular Quebec's water purification program, are the only ones to interact with the 50 industries.

Thus, professionals specialized in each of the industrial sectors, such as pulp and paper, metallurgy and petrochemicals, draw up mandatory depollution programs for the 50 industries. This group is assisted by a technical team mandated to manage the data gathered using informatics, conduct studies on the milieu, and identify technical solutions as well as technological research and development needs.

More specifically, the group responsible for conducting studies of specific milieus establishes the industrial waste standards and objectives. It also studies the local impact zone and provides information on the toxic substances discharged. Based on these standards and objectives, the action group determines which depollution measure or new technology is technically and economically feasible.

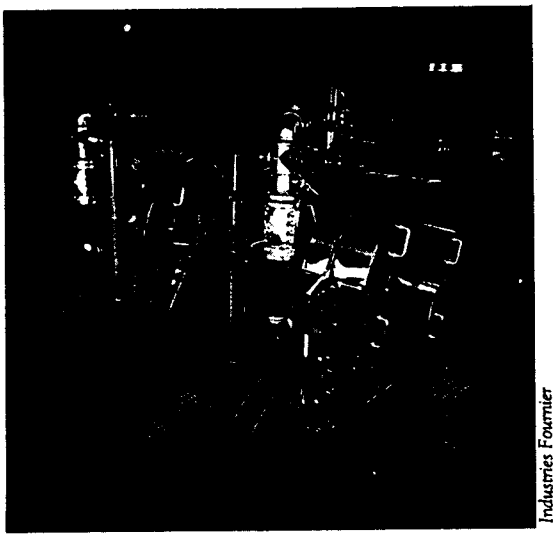
The St. Lawrence Centre provides the action group with the assistance necessary for research and development, laboratory analyses, quality control and ecotoxicological assessments.

Technological Development : a Major Component of the St-Lawrence Action Plan

THE TECHNOLOGICAL DEVELOPMENT program is a major component of the St. Lawrence Action Plan and a priority mandate of the St. Lawrence Centre. It is aimed at promoting the development, demonstration and application of new environmental technologies. If toxic waste is to be substantially reduced, innovation is essential: new industrial processes must be developed or the existing technologies refined.

To attain these objectives, a $50 million budget, $37 million of which has been earmarked for industrial technologies, was allocated to the Plan's technological development component. Two federal departments—Industry, Science and Technology (IST) and Environment Canada—have injected $20 million and $17 million respectively into this sector.

"Our program serves two clienteles," explains Yvan Valiquette, head of the St. Lawrence Centre's Technological Development Division, "technology promoters, those who believe themselves able to solve a specific problem, and polluters, those who demand solutions to their pollution problems. Our role is to bring these two groups into contact and encourage them to develop joint projects aimed at demonstrating new manufacturing or waste treatment technologies."

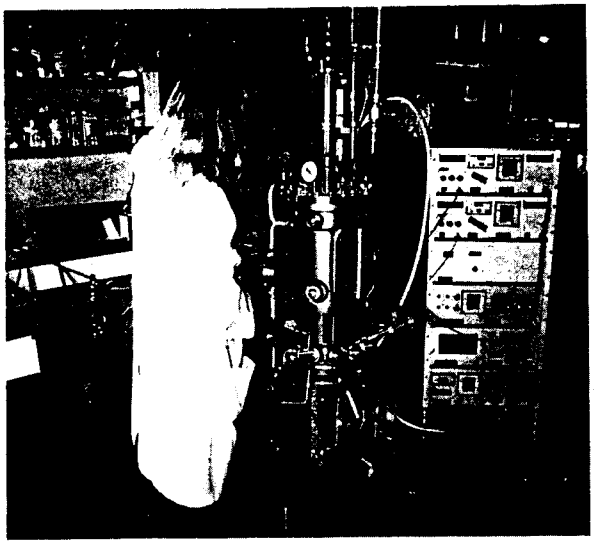


Industries Fournier

In conjunction with the technological development program, Industries Fournier are in the process of developing a rotary press designed for industrial sludge treatment.

Contracting-out Policy

At present, 12 projects have been implemented and 16 others are at the technical and financial evaluation stage. Each project submitted to the SLC costs one million dollars. On the average, the SLC contributes approximately 25% of this amount, while the promoter or user assumes the balance.



Environment Canada

A partner in the St. Lawrence Centre's technological component, the Institut de recherche en biotechnologie is working on a joint project to detoxify waste from contaminated sites.

"To give you a few examples," continues Yvan Valiquette, "one of the projects under way is aimed at decontaminating industrial soils and recovering their mercury content. Another project involves the treatment and recovery of industrial sludge in the petrochemical and metallurgy sectors. A third is designed to reduce the heavy metal content in industrial effluents and recover these metals for industrial purposes."

Technological development and demonstration projects are carried out outside the St. Lawrence Centre in accordance with its contracting-out policy.

The Centre absorbs part of the financial risk connected with the projects, provides scientific monitoring and supervises the various stages of implementation. To assess the propositions submitted and determine whether a given project will net the anticipated results, the Centre uses the services of a network of experts recruited in universities, research centres, engineering consulting firms and government agencies.

The projects supported by the Centre must result in spin-offs for the environmental industry. One such benefit could entail developing the commercial potential of an environmental technology, for example. Spin-offs are important given the long-term goal of contributing to the creation of centres of Quebec and Canadian expertise in the environmental technologies and promoting the develop-

ment of the environmental industry and, in particular, technology transfer activities.

Technological Development First

Before establishing standards and regulations on toxic waste, the technologies required to respect these standards must be made available.

"It's one of the reasons we participate in the establishment of waste disposal standards by submitting reports on the progress of available technologies to legislators," indicates Yvan Valiquette.

The Technological Development Division maintains very close ties with the St. Lawrence Action Plan's federal-provincial action group, which, because of its direct contact with the 50 priority industries, knows their needs and problems very well. The action group is able to direct technological development toward actual needs and provide relative information on how companies intend to participate in certain projects. This procedure also enables the single-window concept to be maintained for all 50 industries, one of the objectives of the Action Plan.

Areas of Research

The main areas of development emphasized by the St. Lawrence Centre are the technologies designed to reduce and eliminate the industrial toxic waste discharged into the St. Lawrence. Six sectors were chosen: pulp and paper, metallurgy, surface treatments, petrochemicals and organic and inorganic chemicals.

The program applies to the technologies related to industrial processes and treatment and purification systems, as well as to clean technologies in the industrial sectors identified.

Also targeted are technologies aimed at safe disposal of hazardous waste and decontamination and restoration of soils and landfill sites containing hazardous substances. Moreover, the SLC takes into consideration technologies related to the treatment, transport and safe disposal of contaminated sediment dredged from the St. Lawrence, and technologies related to confining sediment during the restoration of aqueous sites and developing wildlife habitats.

The St. Lawrence Centre's technological development program is open to all non-profit and profit-oriented organizations, societies or corporations in Canada.

PARTNERS

THE INSTITUT NATIONAL DE LA RECHERCHE SCIENTIFIQUE

INRS

The Institut national de la recherche scientifique offers top-quality expertise in areas of major importance to our society. Logically, then, the INRS and the SLC became partners in one such area, namely, cleanup of the St. Lawrence River.

The two organizations first signed an umbrella research and development agreement, affirming their mutual interest in collaborating on projects carried out under the St. Lawrence Action Plan.

The INRS provides the Action Plan with its acknowledged, valuable expertise in related areas in which it excels, namely, water, oceanology and health. Of the INRS' seven centres, INRS-Eau, based in Sainte-Foy, concluded this first agreement with the St. Lawrence Centre. Signed last month, the agreement focuses on two projects: a report on toxic substances and hydrodynamic modelling.

These two projects, which were allocated a budget of nearly one million dollars and will be carried out over a two-year period, will be completed by INRS-Eau in conjunction with Montreal's ASSEAU company. A dozen ASSEAU employees will assist the six INRS-Eau researchers assigned to the project.

The first project is aimed at producing a report on the toxic substances found in the St. Lawrence River and at developing a method for analyzing actions taken and ways of recovering former uses of the St. Lawrence. Its objectives are therefore vast and consist in rapidly orienting action strategies by defining priorities among industrial targets, and planning campaigns for acquiring any missing data. Other activities to be performed include drafting of a global report on toxic waste, characterization of contaminant movement patterns, specification of local influence by contamination sources, and development of analysis software.

The second project focuses on analysis of contamination in the Tracy-Lake-Saint-Pierre zone. A new, promising analysis approach based on numerical modelling of currents and effluent plumes will be used on this section and presupposes a highly important tool validation process. Methods used will include remote sensing and spatial analysis based on numerical cartography of use and contamination.

VANCOUVER: GLOBE 90

To promote the growth of the environmental industry

GLOBE 90 is both a trade fair centred on the existing environmental technology market and an international conference billed as a true forum where nearly 9000 speakers will deal with specific environmental problems.

The organizers of this event, which will take place in Vancouver from March 19-23, 1990, wanted to organize a forum that would bring together the suppliers and users of environmental protection technologies.

The trade fair is aimed at promoting the application of practical solutions to achieve sustainable development, while discovering the business opportunities in this field. Thus, the growth of the environmental industry is to be promoted through identification of the products, services and technologies necessary to attain sustainable development.

A Stand Centred on International Partnership

Environment Canada's Conservation and Protection Branch is actively involved in this event, and will be represented by the St. Lawrence Centre, whose stand is based on the theme "The St. Lawrence Centre and International Partnership".

"Our number one objective is to present the St. Lawrence Action Plan," specifies Yvan Valiquette, director of technological development at the Centre. "We also want to provide information on the technological development program in particular, one of the four components of the St. Lawrence Action Plan, stressing industrial cleanup, ecotoxicology and biotechnology.

"We're targeting environmental technology promoters in particular," adds Valiquette. "We want to get as much information as possible on what's available elsewhere in the world in addition to increasing our technology promoter clientele. That's why our main thrust is international partnership."

Globe 90 will provide an opportunity to develop mutually advantageous business relations among clients, suppliers, research institutions and government and loan institution representatives from some 50 countries. Speakers and delegates will be able to establish direct contact with a group of countries from North America, Asia and the Pacific Rim in search of urgent, specific solutions to environmental problems.

The St. Lawrence Action Plan at the International Conference

The Conservation and Protection Branch for the Quebec region will also present the St. Lawrence Action Plan and the objectives cited above at the Globe 90 international conference. The director general will take this unique opportunity to inform the international community of the elementary principles underlying the St. Lawrence Action Plan and of the characteristics which made it one of Environment Canada's best-known projects in just two years.

GLOBE 90

Every Two Years

This is the first time an event of this kind has been organized in North America. The fair will bring together manufacturers, salespeople and designers of products, processes, systems, services and technologies aimed at environmental protection. Companies whose plants or manufacturing processes will have to be modified to respect the new environmental standards will also be represented at the fair.

Globe 90 is an initiative of the Canadian government, which invited some 50 countries to Vancouver to discuss the environment in keeping with the World Commission on Environment and Development.

Environment Canada is coordinating the conference on behalf of the federal government, while the corporation Major Event Management Inc. is organizing the trade fair.

Globe will be held again in 1992, and every two years after that to study the progress made and enlarge on previous exhibitions. Each time Globe takes place, a specific region will be emphasized. The Asia Pacific region is being highlighted this year.

READINGS

LES GRANDS LACS ET LEURS UTILISATEURS: ENJEUX ET PERSPECTIVES

In 1986, the United States and Canadian governments asked the International Joint Commission (IJC) to produce a report on the methods for correcting the harmful effects caused by fluctuating water levels in the Great Lakes-St. Lawrence basin. Les Grands Lacs et leurs utilisateurs: Enjeux et perspectives is a preliminary report produced by the project's management team and presented to the Commission. It covers Phase I of the study and includes five appendices and seven addenda in addition to the actual report and its three recommendations.

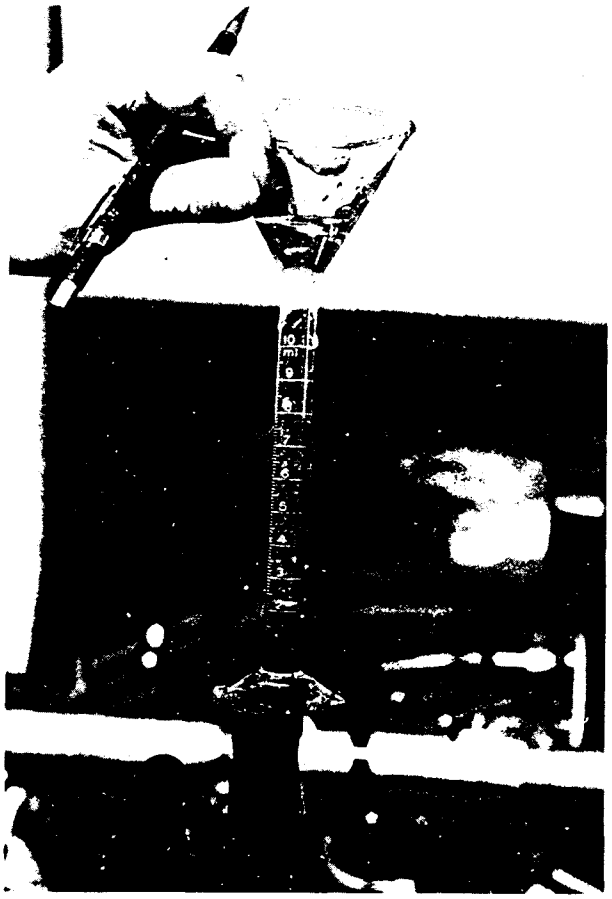
The authors affirm that they have not only obtained substantial results in attempting to define the problem as well as its origins and context, but that they have also increased comprehension of the problem and discovered new facets to the topics discussed which had not been examined in depth in previous IJC studies.

These facets include the essentially systemic quality of the relationships between human beings and nature, the need to consider ecological dynamics before taking measurements, the abundance of erroneous concepts regarding the phenomenon of water level fluctuation and our capacity to act, and the obstacles currently posed by bilateral and hierarchical management to the establishment of concrete, coherent cooperation.

Phase II of the study involves developing recent achievements so as to provide the governments with clear guidelines for effective management of water levels and flows in the Great Lakes-St. Lawrence basin.

International Joint Commission,
100, Metcalfe Street, Ottawa,
Ontario, K1P 5M1

A Broader Understanding of Toxic Inputs



THIS YEAR, the samples used to assess the volume of the various toxic substances discharged into the river will be taken as far as the St. Lawrence estuary. After concentrating their research in the Cornwall region in 1989, St. Lawrence Centre researchers will gather data over the next few months in eight regions located between Cornwall and Quebec City.

Given this agenda, the Toxic Inputs and Ecosystems team has a lot of work ahead. The researchers' first objective is to gain further insight into the quantities of toxic inputs from the Great Lakes, the 50 priority industries and the main tributaries respectively. This process is obviously very important to guiding future actions aimed at reducing the volume of pollutants discharged into the waters of the St. Lawrence.

Eight sections were identified for research purposes. Water and sediment samples will be taken in the regions of Cornwall, Les Cèdres, Beauharnois, the Grand Bassin de Laprairie, Repentigny, Lanoraie, Trois-Rivières and Quebec City. At each of these locations, sampling will occur at different depths and at several points in relation to a transversal line, or "transect" as it is known to specialists. Samples will be taken at two times of the year when hydrological conditions differ substantially: in summer (low-water season) and in fall during a storm.

A List of Toxic Substances

Concurrently, more intensive research will be carried out in Lake Saint-Pierre to determine the quantity of "imported" contaminated sediment in relation to the quantity of local contaminants regularly carried into the lake. In this regard, Lake Saint-Pierre is considered to be somewhat of a "black box" by researchers. The in-depth study of this section will provide precious insight into the time it will take the River to recover once its sources of pollution have been eliminated.

Previous research and specific data gathered under the St. Lawrence Action Plan were the basis for compiling a list of toxic substances for analysis. In addition to headline-making substances such as PCBs and hydrocarbons, the list identifies a total of 156 substances, including several heavy metals, oils and greases, halogenated aliphatic compounds, chlorophenols and chloroguacols. Of course, the list reflects only the work carried out over a specific period, and will change with our general knowledge of toxic inputs.

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Stéphane Lorrain

Not satisfied to be merely "in full swing", Lynn Cleary and her colleagues are already looking to 1991. They know they will have to take more samples from the same transects to confirm their initial results. Given certain indications which lead them to believe that aquatic plant life might play a role in the water transport and elimination of contaminants, they also intend to devote special attention to this phenomenon.

Hydrodynamic Modelling: Decisionmaking Based on Simulation

THE INSTITUT NATIONAL de la recherche scientifique (INRS-Eau) is develputers to simulate the effects of currents and visualize the movement of pollutants in the river environment. Hydrodynamic modelling will even make "in vitro" observation of various depollution scenarios possible.

Given the capital involved in the toxic waste reduction process, decisions in this regard must clearly be based on highly precise data. However, in the case of a complex environment such as the St. Lawrence River, scenarios are not easy to validate. It is therefore necessary to use hydrodynamic modelling, a high-performance technique which, in a sense, brings into play a large quantity of interdependent data.

The procedure consists in gathering the available information on flows, depth measurements, and current speed and direction, in short, on all factors influencing the movement or spread of pollutants. These data are then processed using various computer tools, such as the software program MEFLU (Méthode des éléments finis en fluides), developed jointly by researchers at INRS-Eau, Laval University and the firm TAO Simulation inc.

Hydrodynamic modelling produces a visual representation of the hydrological forces into which data on contamination levels may be integrated and through which several toxic waste reduction scenarios may be tested. The product obtained may be a map, slides, a computerized data base or even animated video images.

INRS-Eau

Modelling enables precise simulation of the effects of currents in various areas, such as downstream of the Lotbinière wharf.

The St. Lawrence Centre is working on this project with the INRS, whose exceptional expertise on the subject is essential to the success of the many areas of development targeted. Several of the activities planned require adaptation of the modelling technology to the cleanup process as it pertains specifically to the St. Lawrence River. The work planned for the first stage of the project should cost approximately $1 million.

Experts with the St. Lawrence Centre and the INRS will begin by studying Lake Saint-Pierre. In this region where pollutants are relatively well identified and current patterns are relatively basic, they hope to obtain conclusive results reasonably soon. More difficult sectors such as Quebec City, where there is a marked difference between high and low tides, will be modelled in subsequent stages.

IN BRIEF

ANNUAL SITTINGS OF THE AQTE

The annual sittings of the Association québécoise des techniques de l'eau (AQTE) recently took place on March 14, 15 and 16 at the Centre des congrès de Laval.

This year's theme was "municipalities and water management". Speakers included representatives from the municipalities of Longueuil, Laval, Repentigny and Granby. Technical-oriented stands and visits were also on the agenda.

A NEW TEST AT THE SLC

A new toxicity test designed to measure effluent quality using algae was recently perfected by the St. Lawrence Centre.

The value of this technique, developed under the direction of Christian Blaise, of the Ecotoxicology and Ecosystems Division, lies in its potential for automation and its versatility. The new test, which is more efficient and requires less cumbersome laboratory equipment, measures the phytotoxicity of microscopic algae following a variable period of exposure, normally four to eight days, and results in detection of any toxic substance likely to affect the algae.

COMING EVENTS

March 19-23, 1990
Globe 90: Trade fair and Conference on international opportunities for business and the environment, Trade and Convention Centre, Vancouver
Telephone: (604) 681-6126

April 5 and 6, 1990
4th Symposium on toxic substances by Environment Canada, MENVIQ, CSST and APCA
Queen Elizabeth Hotel, Montreal
Telephone: (819) 953-1199

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St. Lawrence Action Plan Newsletter

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