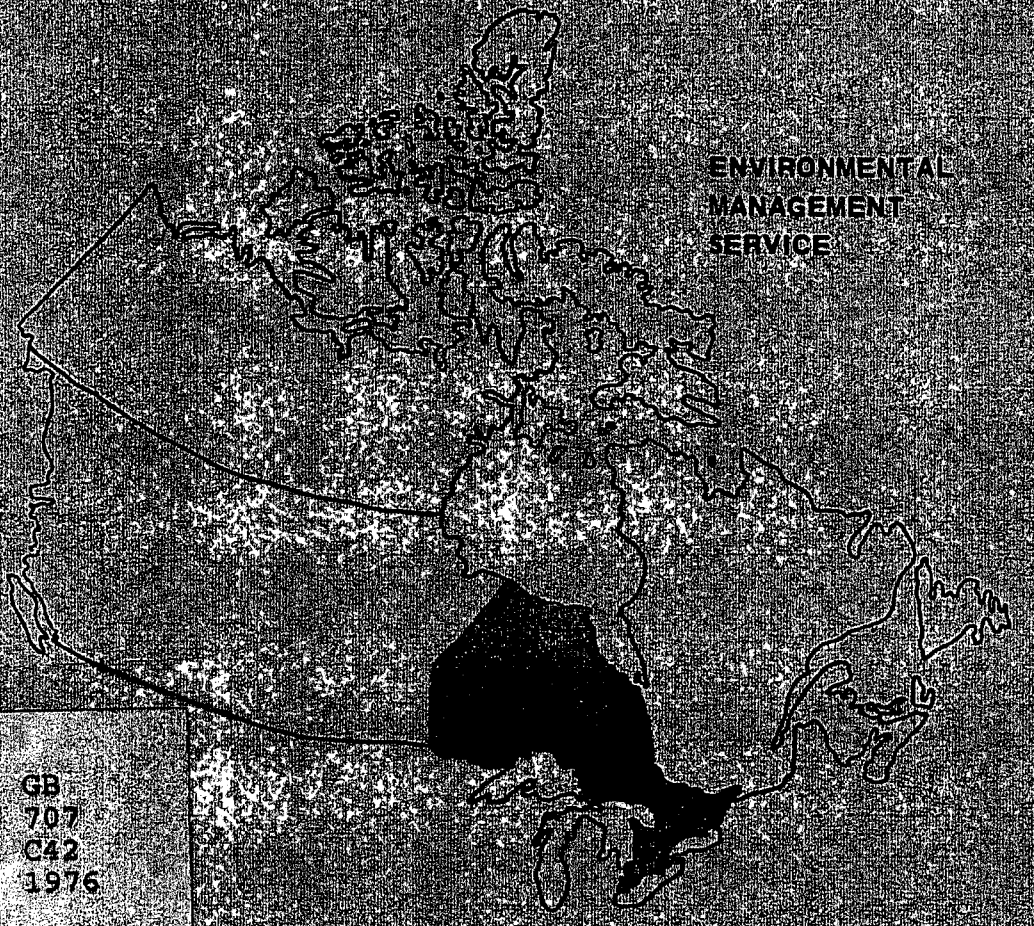
ANNUAL REPORT

1976

INLAND WATERS DIRECTORATE



ENVIRONMENTAL MANAGEMENT SERVICE

SERVICE DE LA GESTION DE L'ENVIRONNEMENT

ANNUAL REPORT

1976

INLAND WATERS DIRECTORATE

ONTARIO REGION

ENVIRONMENTAL MANAGEMENT SERVICE

ENVIRONMENT CANADA

INTRODUCTION

Environmental management is aimed at enhancement of the quality of our environment through conservation and effective deployment of the resource base and minimization of the adverse effects of other activities on the supply and quality of these valuable renewable resources. In keeping with this objective, the mandate of the Inland Waters Directorate, Ontario Region, is to provide information on how the various uses of the waters in the region are affecting water quality and water quantity. The Directorate plans and participates in regional and international programs of water management to maximize the economic and social benefits while giving full consideration to environmental concerns.

By far the area of greatest emphasis is the Great Lakes basin where the accumulation of reliable background information is essential to the task of effective water management. Inland Waters Directorate (IWD) therefore engages in ongoing water management activities of an operational nature including water quality monitoring and surveillance, water quantity surveys, water level and flow regulation of some of the Great Lakes and sample collection and data analysis. These activities are now encompassed by several comprehensive regional programs each of which is directed by a lead agency that utilizes resources and expertise from a cross-section of the various Branches within IWD. The concept of program management is reflected in the format of this annual report.

In order to fulfill its obligations under these programs, the Directorate comprises the Water Quality Branch, the Water Resources Branch, the Water Planning & Management Branch, and the Social Sciences

...../2

Division. The Directorate's offices are located in Toronto (Director & Chief, WP&M) Burlington (Water Quality, Water Planning and Management, Social Sciences and Directorate Administration), Guelph (Water Resources), and Cornwall (Water Planning and Management), with sub-offices at Ottawa North Bay and Thunder Bay (Water Resources), and Niagara Falls (Water Planning and Management). The Toronto office acts primarily as a liaison office to ensure close working relationships with colleagues from the Province of Ontario and federal departments with regional headquarters in Toronto. The structure of IWD is shown in the appended organization chart.

GREAT LAKES BASIN AND WATER POLLUTION PROGRAM

With respect to Canada's obligations under the Canada/U.S. Great Lakes Water Quality Agreement, IWD plays a lead role in the determination and documentation of changes taking place in Great Lakes water quality. These changes are being brought about by the enormous continuing investment in pollution control measures, the identification of new pollution problems, the defining and setting of water quality objectives and the concern for wise management of the Great Lakes as a resource for the benefit of all Canadians.

SOCIO-ECONOMIC STUDIES AND MODELLING

Under the Upper Lakes Reference of the International Joint Commission (IJC), a Waste Loadings Simulation Model was developed to analyze the effects of economic, technological and social trends on waste loadings. Using these trends, quantitative simulation variables

were derived and a series of "possible scenarios" for a number of pollutants was generated. A chapter was subsequently written for the Final Report of the Upper Lakes Reference Group. This simulation model is being extended to encompass the Lower Lakes. Projections of pesticide, fertilizer and road salt uses were also prepared.

As a result of studies which were carried out on the pathways of environmental contaminants, reports on "Phthalates", and "Lead" were published. Participation in the Task Force on polychlorinated biphenyls (PCB) resulted in writing of the report "Background to the Regulation of PCB in Canada", published jointly by the Departments of Fisheries and the Environment and National Health and Welfare.

CANADA/U.S. OPEN LAKE SURVEILLANCE AND ANALYSES

In 1976 staff of the Water Quality Branch took the lead role in the operational aspects of the open lake surveillance project. This activity includes identifying areas where the water quality objectives of the Canada/United States Great Lakes Water Quality Agreement are being violated, how the lakes are responding to remedial programs aimed at improving the quality of municipal and industrial discharges, identifying trends in water quality and detecting emerging problems.

During the year eighteen water quality survey cruises of the international Great Lakes were carried out. Thirteen of these cruises, each of which involved the sampling of 93 stations in Lake Ontario, took

.../4

place in the period April 5 to December 4. A total of 106 stations were sampled on each of three cruises conducted on Lake Erie in support of the U.S. surveillance effort on that lake. Two cruises were carried out on the Upper Great Lakes, one each on Lakes Huron and Superior.

Water Quality Branch staff, using data from the surveillance program, assisted in preparing appendices for the Water Quality Board's annual report to the IJC and provided expert advice as participating members of several committees and sub-committees.

The demand for analytical chemistry support continued at a high level as services were provided to forty-six projects related to programs of the federal government, the IJC and other agencies. Over 18,000 samples comprising water, wastewater, sediments, fish, plants and other water-related substances were analyzed. The total number of tests performed exceeded 140,000.

To expedite analysis of this volume of samples, a new computing integrator was set up to process data generated by several gas chromatographs and has proved to be a valuable tool for automated capture and reduction of data.

Ongoing control on the quality of analytical data produced by the laboratories is maintained by a within-lab check sample program and by participation in the national and inter-regional quality control programs conducted both by the Water Quality Branch and by other agencies.

RESEARCH AND NEAR-SHORE SURVEILLANCE

The Canada/Ontario Agreement on Great Lakes Water Quality provides for the federal-provincial cost-sharing on an equal basis of a near

shore surveillance project that is carried out by the Ontario Ministry of the Environment. IWD responsibilities under the Agreement are to ensure that the program meets the needs of Canada with regard to its obligations under international agreements and to coordinate the provincial program with federal surveillance activities.

The year saw much greater coordination between the two principals to the Agreement. A Surveillance Committee formed in March, 1976 reviewed the project to ensure that it fulfilled the requirements of the IJC Surveillance Plan and that duplication of effort was eliminated. Moreover, increased emphasis was focussed on the importance of water quality trend information for warning of developing problems and for appraising ongoing abatement programs. Typical examples were the surveillance activities in Collingwood Harbour and Penetang Bay where phosphorus removal programs have been implemented for municipal discharges and Nipigon Bay where effluent controls on fish-tainting substances have been effected.

POLLUTION FROM LAND USE ACTIVITIES (PLUARG)

Under the terms of the 1972 Canada/U.S. Agreement on Great Lakes Water Quality the IJC was asked to conduct a study of pollution of the Great Lakes system from agriculture, forestry and other land use activities. As a result, the IJC established the Pollution from Land Use Activities Study Group (PLUARG) to determine whether such sources of pollution exist; if so, to what extent do they occur and what remedial measures would be most practicable.

The responsibilities of IWD within this program have been expanded from the original diffuse waste loadings, based on forecasts of

land use patterns from economic demographic and planning conditions, to include point source loadings. In addition, the Social Sciences Division is participating in an Overview Modelling Group to combine the various IJC Tasks and produce an integrated output which will be of use to environmental managers. Nine working papers have been written by Social Sciences personnel on various aspects of the PLUARG study.

Additional IWD responsibilities include provision of analytical chemistry support for river mouth monitoring studies which were designed to validate the above modelling. Analytical support for the Great Lakes Biolimnology Laboratory (GLBL) lake column simulator experiments continued. During the year some 600 samples were analyzed for a variety of pollution parameters.

GREAT LAKES SHORELINE MANAGEMENT AND DAMAGE REDUCTION PROGRAM

The Great Lakes shoreline is one of the most valuable natural resources in Ontario. In order to promote appropriate utilization of the shoreline area, the responsibilities of the Directorate within this program are the determination of methods for evaluating the consequences of coastal zone development, the development of an effective shoreline management strategy based on identification of areas prone to flooding or erosion and the reduction of damage by assisting local authorities in coping with existing problems. In helping to prevent future problems, the creation of a public awareness to the potential hazards of living near the shore is of paramount importance.

The Water Planning & Management Branch continued its involvement with shoreline damage reduction projects in conjunction with Ocean and Aquatic Sciences and the Ontario Ministry of Natural Resources.

In June, 1976, the results of the Canada/Ontario Great Lakes Shore Damage Survey were released in the form of a Technical Report and an accompanying Coastal Zone Atlas. The Report documented the extent of damage, the amount and effectiveness of existing shoreline protection and the nature and value of shoreline developments. Several recommendations were made, and most important of which were the creation of a public awareness program to inform the public of the risks of building near the shore, a program to define hazard lands and the development of shoreline management strategies to reduce future damage.

Acting on the key recommendations, Canada and Ontario established a joint task force in the summer of 1976. The task force set up public awareness and hazard land mapping programs, a site specific study to evaluate shoreline management alternatives and a shoreline monitoring program. Since public awareness constitutes a very important part of the shore damage reduction projects, a four-year public information program was initiated to alert the public to the problems of locating in the shore zone. An important element in this program was the setting up of local public awareness programs through the Conservation Authorities.

The hazard lands mapping project began in September. The objective of this program is to produce maps delineating all hazard prone areas on the Great Lakes shoreline. Three hazard lines will appear on these maps: the 1:100 year flood level, the 100-year erosion limit and a line indicating unstable shore conditions. The maps will be distributed to local municipalities and conservation authorities for their planning purposes.

..../8

A site specific study of shoreline management alternatives will be implemented over the next two years on an eighteen mile stretch of the Lake Erie shore near Kingsville. The principal objective of this study is the development of methodologies that local planning authorities can use in formulating their own shoreline management strategies. A second objective is the development of a managerial strategy for the Kingsville study area.

Federal-provincial funding is being used to support a 5-year $100,000 per year shoreline erosion monitoring program involving surveys of approximately 160 shoreline locations to measure annual changes in the shoreline.

GREAT LAKES AND ST. LAWRENCE BASIN WATER LEVEL CONTROL PROGRAM

As just about one Canadian in three lives adjacent to and depends upon, the Great Lakes-St. Lawrence River System, the importance of water levels and water quality in this system has been recognized by the governments of Canada and the United States and has led to international agreements regarding activities that will affect the levels in the system. Under IJC References, the Inland Waters Directorate publishes data on water levels and flows, provides engineering and socio-economic support to assist in studies of Great Lakes water levels including regulation of levels, provides staff participation on IJC Boards established for the regulation and monitoring of lake levels, outflows and diversions, and carries out water quality surveys of the Great Lakes connecting channels to determine pollution loadings to the lakes and compliance with specific water quality objectives.

...../9

The levels on all the Great Lakes were above their long-term average values in early 1976. However, below normal water supplies prevailed during the latter half of the year, resulting in sharp declines in the levels. By year end, the level of Lake Superior was about one-half foot below normal while that of Lake Ontario was near normal for that time of year. The levels of the unregulated Lakes Huron, St. Clair and Erie also had declined sharply but were still above normal at year-end.

The Water Planning and Management Branch continued to support the International Joint Commission's International Lake Superior and St. Lawrence River Boards of Control in their regulation of Lake Superior and Lake Ontario outflows. On the Niagara River, technical support was provided to the International Niagara Board of Control in monitoring the water control activities in the Lake Erie-Niagara River area. Considerable effort was related to the performance of the Lake Erie- Niagara River ice boom, for which ice and meteorologic data were collected. Advice was provided to the U.S. Corps of Engineers in the relocation of the American Falls Channel water level gauge which will be used to measure the flows over the American Falls. Branch staff also assisted the International Niagara Committee in determining the amounts of water available, and the amount used, for various purposes under the Niagara Treaty. The proposed extension of the navigation season on the St. Lawrence Seaway continued to require attention.

The International Joint Commission's Report to the Governments on Further Regulation of the Great Lakes was released in 1976. The report describes the technical investigation carried out by the International Great Lakes Levels Board between 1964 and 1974, in which members of IWD

..../10

Ontario Region participated extensively. In early 1977, the Governments responded to the Commission's recommendations and requested further studies on:

(1) the possibilities of limited regulation of Lake Erie consistent with the principle of systematic regulation of the Great Lakes,

(2) the effects on Great Lakes water levels and flows of existing and proposed diversions within, into or out of the Great Lakes Basin, and of existing and reasonably foreseeable patterns of consumptive uses of Great Lakes waters, and

(3) inadequacies of the Great Lakes technical information network, especially in the areas of comparable data acquisition methodology and collection and exchange of meteorological, hydrologic and hydraulic information between Canada and the United States.

The Water Resources Branch continued to operate forty-two water level recorders on the Great Lakes and downstream as far as Cornwall on the St. Lawrence River. All but two of these gauges have now been converted to the metric system and the primary gauges were set to chart datum at the request of the Canadian Hydrographic Service.

Personnel from the Detroit District, U.S. Army Corps of Engineers and the Water Resources Branch undertook two joint measurement programs:

(a) In June, the American Falls Channel gauge was relocated approximately 400 feet upstream of its former location on the channel leading to the American Falls. At the request of the International Niagara

...../11

Board of Control, a series of nineteen discharge measurements were taken in June, and another series of eighteen in October, to establish a stage discharge relationship for the new gauge.

(b) In a continuing program to verify the calibration of the Ashland Avenue gauge for indicating Falls flows, a series of 11 discharge measurements were made from the Robert Moses metering cableway located in the lower Niagara River. These data were collected during October and November.

Increased emphasis was placed on the study of connecting channel loadings of nutrients to and from Lake Ontario. The daily sampling program of the Niagara River at Niagara-on-the-Lake was continued with two 7-day hourly intensive periods of sampling carried out in February and May. An additional automatic sampler was installed at Wolfe Island on the St. Lawrence to monitor the outflow of nutrients from Lake Ontario. Sampling at the Wolfe Island location commenced in August. A report on the hourly sampling at the Niagara River location has been completed and was presented at the 1977 Conference of the International Association for Great Lakes Research.

WATER MANAGEMENT PROGRAM

The primary aim of the Water Management Program is to provide basic water quantity and sediment data necessary for making valid assessments with respect to the influence of man's activities on the environment. Under the Memorandum of Agreement between Canada and Ontario, IWD co-operates with the Ontario Ministry of the Environment, the Ministry of Natural Resources and Ontario Hydro in collecting and publishing hydro-

metric and sediment data. As required by the Agreement, a Coordinating Committee with the federal member as chairman, implements the terms of the Agreement which include maintaining national standards for field and office procedures, and for equipment and instrumentation. The Committee also designates hydrometric station classifications based on nationally developed guidelines.

Another important aim of the program is to ensure that reliable and useful analytical data are produced by Water Quality Branch laboratories across Canada. Key activities in this regard are the development and standardization of analytical methods, the provision of suitable analytical reference standards and the maintenance of a continuing quality control program.

WATER MANAGEMENT

The Water Resources Branch operated a hydrometric network of 351 stations in Ontario as of April 1, 1976, and continued its processing and publishing responsibilities for an additional 56 stations which are operated by various agencies. April 1 also marked the beginning of the second year of the Canada/Ontario Memorandum of Agreement on water quantity surveys. Of the 351 stations involved, 156 stations were designated as Federal, 39 stations as Federal-Provincial, and 156 stations as Provincial. On July 1, the Toronto Area Airport Project involving the proposed Pickering Airport discontinued six stations, leaving only seven hydrometric stations operating for the Airport Project. During 1976, the Branch took approximately 2500 discharge measurements in Ontario and made 2100 level checks. One hundred and sixteen (116) water quality samples were collected and sent to the analytical laboratory at Burlington.

At the start of 1976, a network of twenty-four sediment stations was operated including nine stations associated with the Pickering Airport Project. On July 1, all sediment sampling activity for the Airport Project was discontinued. An internal analysis of priorities relative to the sediment network lead to a further reduction of the sediment network to twelve stations by the end of 1976; however, an additional nine northern stations continue to be sampled at infrequent intervals. A total of 2600 sediment samples were collected and sent to the laboratory in Ottawa for analysis.

In cooperation with the Applied Hydrology Division of the Water Resources Branch in Ottawa, the Branch installed, for test purposes, an acoustic flow meter on the Severn River at Wasdells Falls near Orillia. The site is subject to continuous back-water conditions and should the test prove satisfactory at this site, five stream flow stations now operated to obtain these same data may be discontinued. The station is also tied to a remote sensing satellite and near real-time data on water levels and flow velocities are readily available.

The construction program for 1976 consisted of the installation of three sheet steel weirs, six hydrometric gauging stations, nine telemark water level transmitters, and one acoustic flow meter. Major repairs and maintenance, such as updating electrical services, rebuilding of instrument housings and repairing sheet steel weirs damaged by spring ice floes, were also carried out.

WATER QUALITY METHODS DEVELOPMENT AND CONTROL

Several new analytical methods were developed and implemented in the Water Quality Branch laboratory: determination of NTA in water by gas chromatography, high pressure liquid chromatographic clean-up procedure for

...../14

PCB and organochlorine pesticides, and analysis of fish blood and tissue by graphite furnace atomic absorption.

As national coordinator of method development for all regional IWD water quality laboratories, the Branch undertook work on preservation studies particularily on mercury in water; analysis of fenitrothion, matacil and their metabolites in water and sediment; an XAD resin extraction method for pesticides and PCB in surface and rain waters; determination of mirex in natural waters; analysis of non-residual metals in sediments; and analysis of mercury in fresh and saline waters. Analytical reference standards were also provided on request to the regional laboratories.

A national quality control program which includes participation by federal, provincial, commercial and other agency laboratories is operated by the Branch. Since many of these laboratories contribute analytical data to programs connected with water resources management and pollution control, an assessment of their reliability through the quality control program is essential.

Several national quality control studies, notably, mercury in sediments and PCB in water and sediment extracts were initiated. With the increasing emphasis on sampling of particulates and bottom sediments, sediment reference materials were prepared for quality control studies. Water Quality Branch also coordinated the Check Sample Program of the Federal Interdepartmental Committee on Pesticides and designed and executed collaborative studies with international agencies such as the IJC, the American Society for Testing and Materials and the Association of Official Analytical Chemists.

FLOOD AND EROSION DAMAGE CONTROL PROGRAM

Under the Southwestern Ontario Dyking Agreement, work continued

...../15

with the Province of Ontario on a dyking project designed to protect low-lying farmlands from floods caused by high water and storms. The program was initiated in 1972-73 by the Department of Agriculture, but since 1973 the federal share of the project has been funded by the Inland Waters Directorate under the Canada Water Act. To date, the lower portion of the Thames River and Jeannette Creek have had dyking rebuilt. Although the Baptiste Creek dyking project is underway, the whole northern sector, part of the central sector and a few areas on the Thames River do not yet have the benefit of higher dyking under the present agreement.

Water Planning and Management Branch is negotiating a Flood Damage Reduction Agreement with the Province as part of the Department's national flood damage reduction program. The objective of the program is to define clearly flood risk areas through mapping and take all reasonable measures to limit new investment in those areas. It is expected that successful completion of this Agreement with the Province will facilitate entering into other related agreements in the future.

To aid in solving flood problems in the Montreal area IWD, Ontario Region, undertook studies of Lake Ontario flow regulation as it affects riparian interests downstream. These studies resulted in a proposal to discharge additional water during the winter months and to reduce discharge by an equivalent amount during the spring freshet on the Ottawa River.

BASELINE STUDIES PROGRAM

HUDSON BAY LOWLANDS PROJECT

The Lowlands encompasses over one-fourth of the land mass of Ontario and, for the most part, remains in a pristine state. In the past,

..../16

water quality and quantity data have been collected on a very limited basis in this area. However, these data are essential to describe the present conditions in order to predict the environmental impacts of any proposed development and to provide a baseline to which future conditions can be compared.

Addressing this need for information, the Hudson Bay Lowlands project was initiated to collect and interpret environmental baseline data. The major emphasis during 1976 was on a review of existing information. A literature review and annotated bibliography of available information, along with the identification of gaps in the information, were completed in draft form on the subjects of hydrology, water quality, socio-economics and environmental impacts of development in the area. Recommendations for future work on hydrology, water quality and environmental impacts were prepared. These formed a part of an over-all Regional report in which the rationale for the program was presented, as well as recommendations for future work necessary in the area and a breakdown of the costs involved in such a program.

Data collection was another important aspect of the project. Stream flow data were collected regularly from existing gauging stations in the Hudson Bay Lowlands area and from stations located on rivers draining from the Precambrian Shield into the Lowlands. A Water Resources Branch report entitled "Environmental Baseline Studies in the Hudson Bay Lowlands" described these activities. Water quality data were collected on a periodic basis at many of the gauging stations within the Moose River basin. Water quality data were also collected as part of an intensive integrated summer field study in the Kinoje Lakes area northwest of Moosonee. The Water Quality Branch assisted other Directorates involved in the study by carrying out analyses of water quality samples.

..../17

ENVIRONMENTAL ASSESSMENT AND REVIEW PROCESS (EARP)

Since 1973, development projects such as airports, electric power plants, harbours, sewage treatment plants and so on must pass through an Environmental Assessment and Review Process (EARP) before federal funding or support is given. The primary objective of the process is to ensure that environmental effects are taken into account early in the planning of projects and that the results of the review are used to reduce the environmental impacts of the project.

During 1976, Water Planning and Management Branch staff participated in a number of important EARP activities. Environmental evaluations were carried out on some fifteen projects including proposals to construct headlands, large docks, marinas and commercial development in the Great Lakes shore zone. The Branch served as lead agency for the Coastal Processes Working Group and played a leading role in a number of activities in the areas of coastal zone management and power generation. Highlighting these activities was the preparation of a report on coastal zone management in the spring of 1976. As an extension of this work the Coastal Processes Group commenced a coastal zone problem analysis study for Lake Ontario. Completion of this study is expected in mid-1977.

The Social Sciences Division supplied reviews and comments for EARP concerning airport location and construction. Staff participated in developing a set of guidelines for the Environmental Site Selection of Nuclear Power Plants and served on the Environmental Assessment Panel for the proposed plant expansion of Eldorado Nuclear Limited.

ONTARIO ROYAL COMMISSION ON ELECTRIC POWER PLANNING (PORTER COMMISSION)

The Social Sciences Division provided project leadership in the planning, development, and presentation of a comprehensive Departmental

.../18

Submission to the Ontario Royal Commission on Electric Power Planning (Porter Commission) on the environmental implications of electric power production in the province. The submission presented a review of the Department's mandate and interest in energy matters relating to Ontario in particular, followed by an assessment of specific land use and environmental concerns associated with hydro, fossil, and nuclear power production and electric power transmission. The submission also included a discussion of the broader socio-economic aspects of the energy/environment relationship. A proposal for a second Departmental submission to the Commission, which would deal with renewable energy sources such as solar, wind, and biomass and set out specific Departmental positions and recommendations relating to both conventional power and renewable energy sources, was developed for review and approval by Senior Management Committee.

INFORMATION TRANSFER AND INTERPRETATION

The opportunity exists to communicate with and enlighten the public concerning the various water management programs being carried on by IWD in the Region. It is vital to promote public interest and involvement in these programs by providing information of environmental concerns in readily understandable form through the news media, pamphlets, seminars and displays at events such as the Toronto Boat Show.

Four workshops were organized to communicate the results of the Canada/Ontario Great Lakes Shore Damage Survey to the Conservation Authorities, municipalities and planning organizations and to enlist their active participation in implementing the recommendations. Other efforts to inform and educate the public on Great Lakes water level and erosion problems included setting of the Environmental Management Service's display at the 1976 Toronto International Boat Show, showing the film "Not Man's

to Command" at various meetings and presenting a paper to the Canadian Water Resources Association Annual Meeting on Lake Levels and Shore Damage. Six-month level forecasts for the Great Lakes were provided to the public in the Department's Monthly Water Level Bulletin and associated news release. Commencing in January, Lake St. Clair forecast levels were included in the bulletin for the first time. By year end, steps were taken to coordinate certain aspects of the forecast with the U.S. Army Corps of Engineers to ensure that the public on both sides of the border will be getting essentially the same information.

The Lake Erie outflow report (1860-1964) was republished with an addendum covering the years 1965-1975. A report on the Coordinated Physical Data for the Great Lakes was also completed. Coordination of historic St. Clair and Detroit River flows through 1975 with the U.S. agency was also achieved for a report which is being prepared.

The annual publication "Surface Water Data - Ontario 1975" was published in October, 1976, two months earlier than the issuing of the 1974 Report in 1975. The 1974 Sediment Data for Canadian Rivers was published and distributed. Utilizing resources made available by Headquarters, historical stream flow measurements were reviewed and temperatures extracted. The report, "Water Temperatures of Selected Streams in Ontario" was then published. A program was written to list by category the hydrometric stations contained in the 1976-77 Canada/Ontario Memorandum of Agreement on water quantity surveys. Approximately 400 requests for data, 360 of them by agencies outside EMS, were answered by the Water Resources Branch office at Guelph. In addition, more than 300 requests were answered by its Sub-Offices. These requests resulted in the provision of approximately 3,025 station years of flow and water level record being provided to universities, industries, federal and provincial agencies and private sector (consultants) data users.

..../20

In the area of hydrometric network planning, physiographic data for Ontario, including such parameters as latitude, longitude, elevation, slope, drainage patterns and lakes on a ten kilometre square grid pattern were completed. Work has now begun on the extraction of Type 2, Physiographic Data, which includes distance to the sea, barrier height, and shield effect. A search was initiated for suitable maps for the extraction of Type 3, Physiographic Data, which includes soil classification and permeability indices.

In February, 1976, Water Resources Branch hosted a Supervisors' Training Course. The course, conducted by training officers from Headquarters Staffing, Training and Personnel Directorate, was attended by Water Resources Branch representatives from across Canada. The Ontario Region hosted the 1976 Water Resources Branch Annual Meeting in June at the Great Lakes Forest Research Centre in Sault Ste. Marie. In September, Mr. Isaac Willner, District Officer, Central District, Hydrologic Services, Israel, visited the Branch office for three days, spending one day in the office and two days in the field with the technical staff. In November, the Branch conducted a three day Northern Survival Course followed by a two day St. John's Ambulance First Aid Course. On a number of occasions during the year, the Branch demonstrated basic discharge measurement techniques to students from various technical training institutes and to employees of consulting engineering firms.

A report was completed by the Social Sciences Division on "A Follow-up Study to Evaluate the IJC's 1974 Hearings" (regarding Great Lakes Levels), following revised procedures to increase the effectiveness of public participation. Public participation activities also included a paper entitled "Prospects and Potential for Public Participation in Environmental Management: A Perspective", as a contribution to the EMS Workshop, in May,

.../21

on the same theme.

MANAGEMENT AND ADMINISTRATION

In 1976 the Directorate administered approximately 35% of the EMS Ontario Region financial resources with less than 20% of the man year resources even though IWD programs involved extensive field operations. The resources administered and managed included operational fundings under international and federal-provincial agreements as well as grants and contributions under similar agreements.

Staff of the Social Sciences Division participated in the Working Group that produced the report "EMS Issues Review and Sub-Program Development" for the Regional Program Committee. This report is expected to have a significant effect on EMS Ontario Region planning over the next five years.

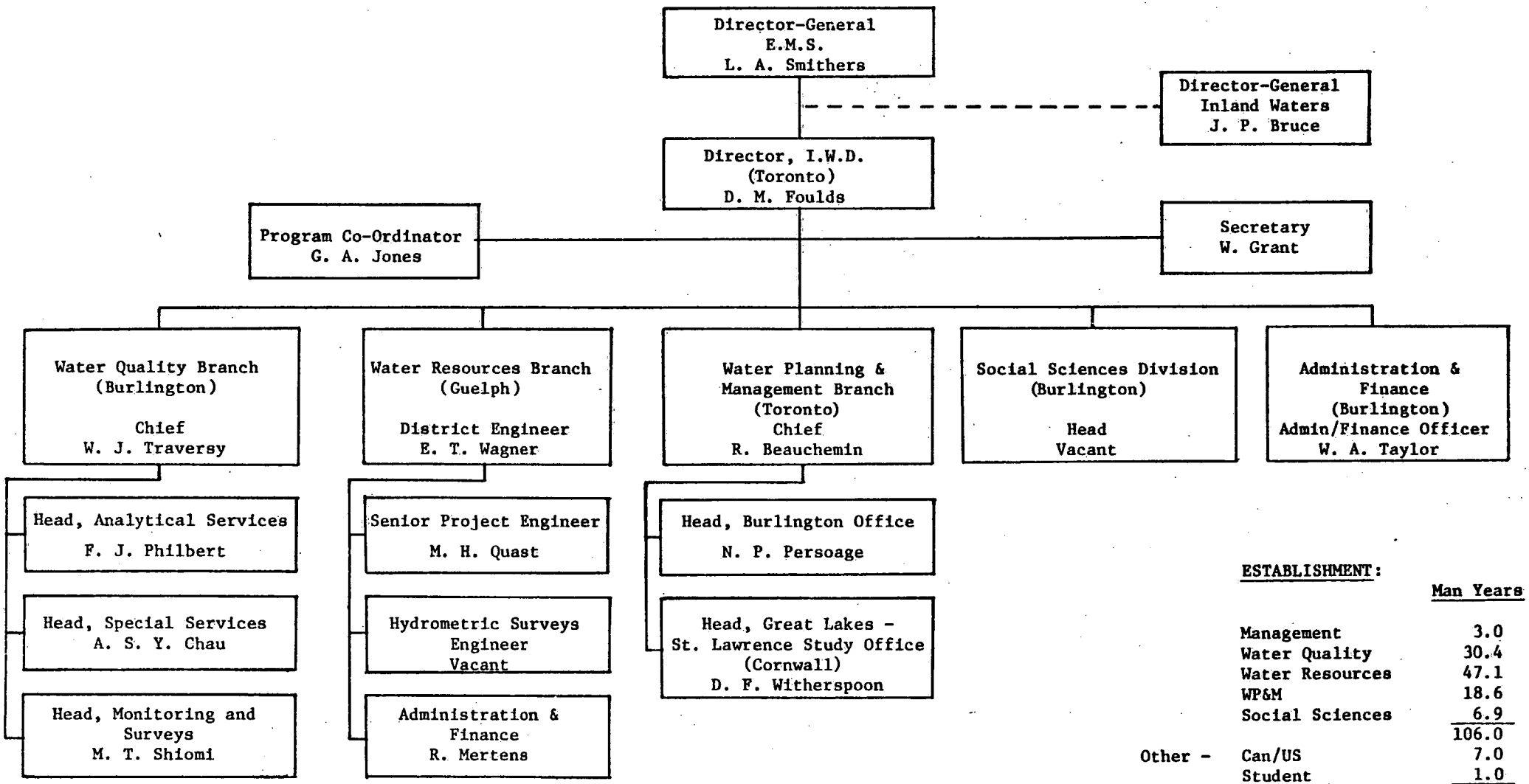
In October the Water Resources Branch sub-office at Sault Ste. Marie was moved to Thunder Bay to enable the staff to be closer to their area of responsibility. As of the end of the year responsibility for twenty-one hydrometric stations was transferred from the Western and Northern Region to the Ontario Region.

In the area of management studies, further work was carried out to assist in the implementation of Performance Measurement Systems in the Water Quality and Water Resources Branches.

ENVIRONMENTAL MANAGEMENT SERVICE

INLAND WATERS DIRECTORATE - ONTARIO REGION

ORGANIZATION CHART



ESTABLISHMENT:

		Man Years
	Management	3.0
	Water Quality	30.4
	Water Resources	47.1
	WP&M	18.6
	Social Sciences	6.9
		106.0
Other -	Can/US	7.0
	Student	1.0
		114.0

December 31, 1976

PUBLICATIONS AND PRESENTATIONS

WATER QUALITY BRANCH

A.S.Y. Chau and K.A. Terry. "Analysis of Pesticides by Chemical Derivatization III, Gas Chromatographic Characteristics and Conditions for the Formation of Pentafluorobenzyl Derivatives of Ten Herbicidal Acids". Manuscript accepted for publication in the Journal of the AOAC.

John A. Coburn and A.S.Y. Chau. - "Confirmation of Pesticide Residue Identity, Part IX, Organophosphorus Pesticides" Environmental Letters, 10 (3), 1975.

John A. Coburn, B.D. Ripley and A.S.Y. Chau. - "Analysis of Pesticide Residues by Chemical Derivatization, Part II, N-Methyl Carbamates in Natural Waters". Journal of the AOAC, January 1976.

Haig Agemian and A.S.Y. Chau. - "An Improved Digestion Method for the Extraction of Mercury from Environmental Samples". Analyst, 101, 91-95, (1976).

A.S.Y. Chau and K. Terry. "Analysis of Pesticides by Chemical Derivatization, I. A New Procedure for the Formation of 2-chloroethyl Esters of Ten Herbicidal Acids". Journal A.O.A.C., 58, 1294-1301. (1975).

John A. Coburn and A.S.Y. Chau. "Determination of 3-trifluoromethyl-4-nitrophenol (TFM) in Natural Waters". - Accepted for publication in the J.A.O.A.C. July 1976.

Haig Agemian and A.S.Y. Chau. - "Analysis of Pesticides by Chemical Derivatization IV. A sensitive gas chromatographic Method for the Analysis of MCPA and MCPB herbicides after esterification with pentafluorobenzyl bromide". - Accepted for publication in The Analyst, (1976).

F.J. Philbert, O. El Kei, W.D. Blythe and Y.M. Sheikh, "Applicability of the Technicon AutoAnalyzer I and II Systems for Shipboard Analysis of Great Lakes Water Samples." IWD Technical Bulletin No. 93.

O. El Kei, "An Automated Method for the Determination of Low Level Kjeldahl Nitrogen in Water and Wastewater". Accepted for publication in Analytica Chimica Acta.

W. A. Glooschenko, W.M.J. Strachan and R.C.J. Sampson, "Distribution of Pesticides and PCB's in Water, Sediment and Seston of the Upper Great Lakes". Accepted for publication in the Pesticides Monitoring Journal.

..../2

K.I. Aspila and H. Clignett, "Semi-automating the Operations of an HGA-2000 Furnace Used on a Perkin-Elmer 503 Atomic Absorption Spectrophotometer Equipped with a Peak Read Function". Accepted for publication in Analytical Letters.

K.I. Aspila, Haig Agemian and A.S.Y. Chau, "A Semi-automated Method for the Determination of Inorganic, Organic and Total Phosphate in Sediments". Analyst, 101, 187-197, (1976).

A paper entitled "Quality Control in the Analysis of Pesticides in Water - An Interlaboratory Comparison" by K.I. Aspila was presented at the 30th Annual Technical Conference of the American Society for Quality Control at Toronto on June 9th.

Haig Agemian and A.S.Y. Chau, "A Study of Different Analytical Extraction Methods for non-detrital Heavy Metals in Aquatic Sediments". Accepted by Archives of Environmental Contamination and Toxicology.

Haig Agemian and A.S.Y. Chau, "An Evaluation of Extraction Techniques for Metal Analysis in Sediment". Accepted by The Analyst.

O. El Kei, "An Automated Method for the Determination of Low Level Kjeldahl Nitrogen in Water and Wastewater". Analytica Chimica Acta, 86, October 1976, 63-68.

F.J. Philbert - presented a paper entitled "Laboratory Quality Control Procedures Followed in the Water Quality Branch Laboratory of IWD, Ontario Region", at the meeting of PLUARG Task C analysts in Toronto.

Haig Agemian and A.S.Y. Chau, - "Evaluation of Extraction Techniques for the Determination of Metals in Sediments". Analyst, 101, 761, (1976).

Haig Agemian and A.S.Y. Chau - "Determination of Pesticides by Derivative Formation, Part IV. A Sensitive Gas Chromatographic Method for the Determination of MCPA and MCPB Herbicides after Esterification with 1-Bromomethyl-2,3,4,5,6- pentafluorobenzene." Analyst 101, 732, (1976).

R.C.J. Sampson has been recognized as a contributing author of the book Porphyrins and Human Disease published by S. Karger, summarizing the proceedings of the First International Porphyrin Meeting at Frieburg in May, 1975.

W.A. Glooschenko, N.M.J. Strachan and R.C.J. Sampson, "Distribution of Pesticides and Polychlorinated Biphenyls in Water, Sediments and Seston of the Upper Great Lakes - 1974". Pesticide Monitoring Journal, 10(2), September 1976.

Mass Spectral Confirmation and Analysis by the Hall Detector of Mirex and Photomirex in Herring Gulls from Lake Ontario; - Douglas J. Hallett, Ross J. Marstrum, Frank Onuska, Michael E. Comba, and Robin Sampson; J. Agric, Food Chem, Vol. 24, No. 6, 1976.

... /3

SOCIAL SCIENCES DIVISION

Batteke, J.P.H. A Simulation Model for Exploring Future Trends in Waste Loadings to the Upper Great Lakes. Presented at The 4th Global Modelling Conference, Laxenburg, Austria. September 1976.

Eatock, A. The Need for Cost Benefit Analysis in Toxic Substance Usage. Published in the Proceedings of the National Conference on Polychlorinated Biphenyls, Chicago, Illinois, U.S.A. November 1975.

Leah, T.D. The Production, Use and Distribution of Lead in Canada. Environmental Contaminants Inventory Study No. 3, Report Series No. 41. 1976.

Leah, T.D. The Production, Use, and Distribution of Phthalic Acid Esters in Canada. Environmental Contaminants Inventory Study No. 4, Report Series No. 47. 1976. In Press.

Batteke, J.P.H. Upper Great Lakes Waste Loadings Trends Simulation Model" A Summary Description. June 1976.

Coleman, D.E. and S. Ma. Upper Great Lakes Waste Loadings Trends Simulation Model" User's Manual. February 1976.

Coleman, D.E. Recreational Land Use Forecasts - Great Lakes Basin 1972-2020, PLUARG Task B-5. March 1976.

Deutscher, P. Upper Great Lakes Waste Loadings Trends Simulation Model" Inter-Agency Data Contributions. June 1975 - Revised April 1976.

Deutscher, P. The Path of Ontario Agriculture: Land Use Projections 1972-2020, PLUARG Task B-5. January 1976 - Revised May 1976.

Deutscher, P. The Usage of Biocides, Fertilizers, and Road Salts in the Great Lakes Basin: Projections to 2020, PLUARG Task B-5. May 1976.

Eatock, A. Operational Performance Measurement System Feasibility Study Report. January 1976.

Muir, T. Commercial-Industrial Land Use Projections - Great Lakes Basin 1972-2020, PLUARG Task B-5. January, 1976.

Muir, T. Upper Great Lakes Waste Loadings Trends Simulation Model: Economic Projections, Industrial-Municipal Waste Treatment - Methodology. February 1976 - Revised May 1976.

Robinson, D. Scenarios on Social, Institutional, Technological, and Other External Factors, and Their Impact on Land Use Forecasts for the Canadian Great Lakes Basin to the Year 2020, PLUARG Task B-5. December 1976. (NOTE: This paper replaces former edition under Robinson and Earn, dated March 1976).

... /4

Robinson, D. Upper Great Lakes Waste Loadings Trends Simulation Model: An Interpretation of Social, Institutional, and Technological Trends and Synergisms. January 1976.

Robinson, D.L. Prospects and Potential for Public Participation in Environmental Management: A Perspective. April 1976.

Sinclair, M.R. A Follow-up Study to Evaluate the IJC's 1974 Hearings. September 1976.

Sudar, A. Urban Land Use Forecasts - Great Lakes Basin 1972-2020, PLUARG Task B-5. January, 1976 - Revised May 1976.

Sudar, A. and P. Deutscher. Land Use Change in the Canadian Great Lakes Basin 1971-2020, PLUARG Task B-5. May 1976. (Formerly entitled - Rural Urban Land Conversion and Impacts - dated March 1976).