INVENTORY OF RESEARCH PROJECTS 1978-79

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Ontario

Ministry of the Environment

The Honourable
Harry C. Parrott, D.D.S.,
Minister

Graham W. Scott,
Deputy Minister

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INVENTORY OF RESEARCH PROJECTS

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HAZARDOUS CONTAMINANTS
COORDINATION BRANCH
135 ST. CLAIR AVENUE WEST
TORONTO, ONTARIO M4V 1P5

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HAZARDOUS CONTAMINANTS
COORDINATION BRANCH
135 ST. CLAIR AVENUE WEST
TORONTO, ONTARIO M4V 1P5

PREFACE

The Inventory of Research Projects is produced by the Research Advisory Committee with the assistance of staff of the Development and Research Group. Any questions concerning specific projects should be addressed to the Director of the Branch which initiated the study.

P. D. Foley,

Chairman,

Research Advisory Committee.

INTRODUCTION AND EXPLANATION

ORIGIN

The Ministry of the Environment first published an inventory of research and development projects in June, 1973. The publication was initiated by the Deputy Minister who recognized the need for a comprehensive list of research and development projects which would be readily available to all agencies. The initial report was prepared by the Strategic Planning Branch. The Research Advisory Committee was appointed in 1975 and is now responsible for the preparation of the report.

PURPOSE

The purpose of this report is to promote the communication of the Ministry of the Environment's activities to the research community, and to facilitate a more efficient use of capital and human resources devoted to environmental research. It is hoped that the information contained here will assist those currently conducting studies, by providing them with access to projects in this Ministry which are related to their own. Another major objective is to foster co-operative efforts and prevent the duplication of programs, particularly among Ministries of the Ontario Government. Ultimately, the inventory and successive updates will provide a comprehensive background for the selection of environmental research priorities, revealing those areas which are already being extensively examined, and those which demand increased attention.

ORGANIZATION OF THE INVENTORY

The report consists of profiles of the individual research projects being conducted by each Branch of the Ministry in the 1978-79 fiscal year, as they were identified by the Branches themselves. It includes in-house activity, as well as grants to Universities, contract research and projects supported by joint funding with others.

The inventory includes:

(1) all projects conducted outside the Ministry, through Ministry of the Environment funding;

(2) all research carried out by the Ministry's Branches.

It is outside the objectives of the inventory to include the routine test series and studies which implement on-going management programs.

Ontario

Ministry of the Environment

Letter No. 317

MINISTRY OF THE ENVIRONMENT
FEB 21 1979
PESTICIDES CONTROL SECTION

135 St. Clair Avenue West
Suite 100
Toronto, Ontario
M4V 1P5

Memorandum:

February 19, 1979

To: RESEARCH ADVISORY COMMITTEE

B. I. Boyko
T. Brydges
M. Fitch
P. D. Foley (Chairman)
D. A. McTavish
J. B. Patterson
G. C. Ronan
W. R. Smithies
S. Stevens
D. W. Wilson

Copies to:

A. R. Chisholm, Executive Secretary
Pesticides Advisory Committee
5th floor, Mowat Block
Queen's Park, Toronto

P. J. Crabtree
Waste Management Advisory Brd.
9th floor, 1 St. Clair Ave. W.
Ministry of the Environment
Toronto

From:

D. F. Rhodes
Manager, Environmental Research
Provincial Lottery Trust Fund

Subject: INVENTORY OF RESEARCH PROJECTS for FY 1978/79

This letter is written to advise you that the FY 78/79 Inventory of Research Projects has now been printed and a copy is herewith attached for your use.

If you require additional copies please advise me.

For 1978/79 we had printed 250 copies of the Inventory. They are being distributed by the Ontario Government Mail Services, Queen's Park according to the Revised Mailing List for M.O.E. Research Reports as follows:-

Source	Addresses	Sections
In-House M.O.E. Addresses	56	1
Municipal Governments	8	2a
Other Provincial Governments in Ontario	2	2b
Provincial Governments outside of Ontario	15	2c
Federal Government	3	2d
U.S.A. Governments	20	2e
Governments outside North America	4	2f
Libraries in Ontario (University)	22	3a
Libraries in Ontario (Non-University)	16	3b
Libraries outside of Ontario	20	3c
Government Libraries	7	3d
Libraries in U.S.A.	15	3e
Libraries outside North America	5	3f
Total Inventories mailed out February-March, 1979 =	193	

Douglas F. Rhodes

D. F. Rhodes
DFR:mm
attach.

FORMAT OF FY 78/79 INVENTORY

The projects are grouped under their funding Branches, Boards or Committees. The profiles supply the following information:

Branch	Ministry branch responsible for the project and who should be contacted for further information.
Project Title	For identification and filing.
Key Words	The key words relating to each project are listed alphabetically in the Index at the back of the Inventory.
Principal Investigator	Contact for additional information on project.
Liaison Officer Supervisor or/ Senior Ministry Official	Responsible for the project.
Research Category	Identifies whether work is done in Ministry (internal) or outsied (grant or a solicited or unsolicited contract) and if project is multi-year and if concurrent to a second related project.
Objective	Immediate reasons for undertaking the project.
Description	Details of the projects focuses on the methodology employed and indicates the exact nature of the research to persons with expertise in the field. Where a set of projects have been grouped under one title, the individual projects receive separate treatment under the "Description" heading and thereafter.
Duration of Project in Years	Starting and Completion Dates.
Budget	Current year total dollars and man years for the project. These are estimates only.
Source of Funds	Projects in the regular work program are funded out of normal branch budgets, those in the special category use funds set up particularly for the project and are identifiable in the Ministry budget. Most of the jointly funded projects are federal-provincial programs such as those of the International Joint Commission and the Canada/Ontario Agreement. The Provincial Lottery funds support various projects that are jointly funded with the Federal Government or others.

Reporting Procedure	Whether there will be interim and/or final reports available; and when anticipated.
Participation by Other Ministries	This space indicates if the project is assisted from other Provincial Ministries by either funding, equipment or staff support.
Remarks	Special comments on the project not listed above are shown here.

RESEARCH ADVISORY COMMITTEE

The Research Advisory Cimmittee (RAC) was created in 1975 to provide a broadly based co-ordinating and planning group for the Ministry's research program. The committee is made up of representatives of the various Ministry Branches who have research responsibilities plus a member from the Program Planning & Evaluation Branch, a representative from the Regional Offices and a medical advisor from the Ministry of Labour.

The Research Advisory Committee is also responsible for the administration of the Provincial Lottery Funds which are available for health oriented environmental projects. Over twenty (20) projects are being funded in 1978/79 at a budget of $2.0 million. All but three (3) of these projects were research oriented and are included in this summary. One of the responsibilities of the RAC is the annual publication of the Inventory of Research Projects.

Comparison of FY 77/78 Research Projects with FY 78/79 Research Projects According to Time Duration

	FY 77/78	FY 78/79
Projects in their first year	58	60
Projects in their second year	25	36
Projects in their third year	23	18
Projects in their fourth year	9	9
Projects existing for five years or longer	25	18
Total Research Projects	140	141
Projects conducted within the Ministry of the Environment	85	63
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Ministry of the Environment

Ontario

AR-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:*

PROJECT TITLE: "Initiation of the Design and Construction of an Optimized Prototype Pease-Anthony Venturi Scrubber"

KEY WORDS: Scrubbers, optimization, Venturi.

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. A.W. Gnyp, Dept. of Chem. Eng., University of Windsor

LIAISON OFFICER OR SUPERVISOR Mr. E.T. Barrow, Head, New Technology & Process Evaluation

RESEARCH CATEGORY: *INTERNAL GRANT* X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:

To initiate the correlation of six years of theoretical and experimental research in terms of an optimized Pease-Anthony Venturi scrubber. The ultimate goal is to build a unit that would be available to Ontario based industries with severe particulate control problems.

DESCRIPTION:

This year will involve an experimental program involving variation of the amounts of liquid injected at the throat and diffuser sections. Emphasis would be on measurement of:

i) jet penetration lengths
ii) liquid film flow rates on all four scrubber surfaces
iii) local core droplet mass fluxes
iv) gas velocity distributions
v) static pressure variations along the scrubber axis for several different combinations of liquid injection rates to the throat and diffusers.

DURATION OF PROJECT ——— *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* ———

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		$9,175		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED?

Yes

PARTICIPATION BY OTHER MINISTRIES:

No

REMARKS:

Ministry of the Environment
Ontario

AR-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE:

PROJECT TITLE:
"Laser-Beam Monitor of the Total Volume of Particles in Stack Gases"

KEY WORDS:
stack gases, laser-beam monitor.

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. J. Motycka, Dept. of Mech. Engineering, University of Toronto

LIAISON OFFICER OR SUPERVISOR Mr. V. Ozvacic, Head, Source Assessment Unit

RESEARCH CATEGORY:
INTERNAL GRANT X
UNSOLICITED CONTRACT —
SOLICITED CONTRACT —
MULTI-YEAR PROJECT —
CONCURRENT PROJECT —

OBJECTIVE:
1. To initiate a stack environment investigation.
2. To continue development of theory.
3. To execute an experimental feasibility study.
4. To modify instrument design.

DESCRIPTION:
Work will involve analysis of in-stack air pollution requirements and specification of optimum instrument parameters. Further development of theory both of concentration and mean size measurement for irregular particles found in-stack, establishment of upper and lower concentration limits and measurement accuracy. Feasibility study and optimization of major parameters for the general air-pollution in-stack application.

DURATION OF PROJECT ——— *YEARS*
PRESENT YEAR IS 1 *YEAR*
REPORTING DATE ———

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$15,000		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING —
JOINTLY FUNDED PROJECT —
OTHER —

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:
No

REMARKS:

Ministry of the Environment
Ontario

AR-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:*

PROJECT TITLE: "Atmospheric Persistance of Polychlorinated Biphenyls"

KEY WORDS: PCB, atmospheric persistence.

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. A.J. Yarwood, Dept. of Chemistry, McMaster University

LIAISON OFFICER OR SUPERVISOR Dr. R. Caton, Head, Hazardous Contaminants and Research Planning Unit

RESEARCH CATEGORY: *INTERNAL GRANT* X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE: To determine the atmospheric persistence of polychlorinated biphenyls with respect to photo-chemical degradation in laboratory experiments.

DESCRIPTION:
Determine the chemical lifetime of PCB's (pure isomers and/or commercial mixtures) with respect to photochemical degradation under simulated atmospheri conditions. Determine the products and mechanism of the reactions of PCB unde simulated atmospheric conditions. Determine whether the PCB's adsorbed on particulate are uniformly distributed on particles of different sizes.

DURATION OF PROJECT ——— *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* ———

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$15,000.		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
No

REMARKS:

Ministry of the Environment
Ontario

AR-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:*

PROJECT TITLE: "Multiple Field Applications of a System Based on the Trace Atmospheric Gas Analyser (TAGA)"

KEY WORDS: Trace Air Analysis, TAGA, Analyser, Dosimeter

PRINCIPLE INVESTIGATOR AND AFFILIATION Prof. J.B. French and Dr. N.M. Reid, Institute of Aerospace Studies, U. of T.

LIAISON OFFICER OR SUPERVISOR Dr. E. Singer, Head, Monitoring of Instrumentation De-elopment Unit

RESEARCH CATEGORY: *INTERNAL GRANT* X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:
To apply a novel instrument developed at UTIAS to the measurement of trace atmospheric components with particular reference to hazardous materials.

DESCRIPTION:
Improve dosimeter disign, elution solvent purity and study various adsorption media for specific properties. Effort to demonstrate the power of the TAGA readout to identify and to quantitate passive dosimeter elutants. Carry out field trials with passive dosimeter at 3 sites.

DURATION OF PROJECT ——— *YEARS* *PRESENT YEAR IS* 4 *YEAR* *REPORTING DATE* ———

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$17,680		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
No

REMARKS:

Ministry of the Environment

Ontario

AR-5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:*

PROJECT TITLE:
"Development of a Technique for Monitoring Sulphuric Acid in the Gas Phase Using the TAGA System"

KEY WORDS:
TAGA, sulphuric acid, gas phase, measurement

PRINCIPLE INVESTIGATOR AND AFFILIATION Prof. J.B. French and Dr. M. Reid, Institute for Aerospace Studies, U. of T.

LIAISON OFFICER OR SUPERVISOR Dr. E. Singer, Head, Monitoring and Instrumentation Development Unit

RESEARCH CATEGORY:
INTERNAL GRANT — X
UNSOLICITED CONTRACT — *SOLICITED CONTRACT* —
MULTI-YEAR PROJECT — *CONCURRENT PROJECT* —

OBJECTIVE:
To develop the TAGA methodology for measuring sulphuric acid in stack gas.

DESCRIPTION:
Modification, calibration and field trials will be done on the TAGA apparatus for the analysis of sulphuric acid in stack gases.

DURATION OF PROJECT ——— *YEARS* *PRESENT YEAR IS* 1 ——— *YEAR* *REPORTING DATE* ———

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$16,340		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM — X
SPECIAL MINISTRY FUNDING —
JOINTLY FUNDED PROJECT —
OTHER —

IS A REPORT ANTICIPATED?

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

AR-6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:*

PROJECT TITLE:
"Continuous Monitoring of PAN in the Polluted Troposphere"

KEY WORDS: PAN, analysis, peroxyacetyl nitrate, monitoring

PRINCIPLE INVESTIGATOR AND AFFILIATION Prof. P.A. Cherniak, Dept. of Chemistry, Brock University, St. Catherines, Ontario.

LIAISON OFFICER OR SUPERVISOR Dr. E. Singer, Head, Monitoring & Instrumentation Development Unit

RESEARCH CATEGORY:
INTERNAL GRANT — X
UNSOLICITED CONTRACT —
SOLICITED CONTRACT —
MULTI-YEAR PROJECT —
CONCURRENT PROJECT —

OBJECTIVE:
To develop an analytical system for continuous monitoring of peroxyacetyl nitrate in ambient air.

DESCRIPTION:
The design, construction, calibration and testing of an accurate, inexpensive, easy-to-use, in-field analytical system (glc-electroncapture detector) for the automatic and continuous measurement of ppb concentrations of peroxyacetyl nitrate (PAN) in polluted air.

DURATION OF PROJECT ——— *YEARS* *PRESENT YEAR IS* 1 ——— *YEAR* *REPORTING DATE* ———

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		$14,000		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM — X
SPECIAL MINISTRY FUNDING —
JOINTLY FUNDED PROJECT —
OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Ministry of the Environment
Ontario

AR-7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE:

PROJECT TITLE:
"Road Dust Collected on Air Filters"

KEY WORDS: road dust, air filters, neutron activation analysis

PRINCIPLE INVESTIGATOR AND AFFILIATION Prof. K. Fritze, Dept. of Chemistry, McMaster University

LIAISON OFFICER OR SUPERVISOR Dr. S. Gewurtz, Hazardous Contaminants and Research Planning Uni

RESEARCH CATEGORY:
INTERNAL GRANT X
UNSOLICITED CONTRACT ——
SOLICITED CONTRACT ——
MULTI-YEAR PROJECT ——
CONCURRENT PROJECT ——

OBJECTIVE:
1. To determine the relative contribution of road dust and industrial fall-ou in particulate matter collected on air filters.
2. To develop methods of neutron activation analysis to permit the measuremen of many elements in a large number of samples.

DESCRIPTION:
A mathematical model has been developed to solve the above problem. With actual measurements, it is suggested that the road dust be chemically labelled and the material collected on the air filters is to be analyzed for the label and its concentration should give a measure of the road dust contribution to the total dustfall and airborne particulate matter. This would allow the calculation of the industrial fall-out contribution. It appears that a maximum of information will be obtained by combining the labelling experiments with neutron activation analysis of the air filters.

DURATION OF PROJECT —— *YEARS*
PRESENT YEAR IS 2 *YEAR*
REPORTING DATE ——

BUDGET:
TOTAL DOLLARS — *TOTAL PROJECT*
TOTAL DOLLARS — *CURRENT YEAR* $22,000.
MAN YEARS — *TOTAL PROJECT*
MAN YEARS — *CURRENT YEAR*

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
No

REMARKS:

Ministry of the Environment

Ontario

AR-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:*

PROJECT TITLE:

"Environmental Control and Safety Aspects of Flaring"

KEY WORDS: hydrocarbon flares

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. T.A. Brzustowski, Vice-President, Academic, University of Waterloo

LIAISON OFFICER OR SUPERVISOR Mr. E.T. Barrow, Head New Tech. & Process Evaluation

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE: 1. To measure the temperature and composition fields in laboratory-scale model flares in a wind-tunnel.

2. To develop useful finite difference techniques for numerical modelling of flames on elevated flares.
3. To extend the applicant's top-hat model of turbulent diffusion flames in a cross-wind.

To replicate and extend the preliminary results on the air-dilution of stack gas emerging into a cross-wind at very low values of the momentum flux ratio; to derive statistically-significant correlations, and to establish design rules on minimum purging rates and the related problem of stack-sampling errors.

DESCRIPTION:

The work this year will involve model experiments and simple theoretical models, which predict scaling laws, and large computer models predicting the characteristics of the flame in great detail.

DURATION OF PROJECT —— *YEARS* *PRESENT YEAR IS* 6 *YEAR* *REPORTING DATE* ——

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		$10,000		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

No

REMARKS:

Ministry of the Environment

Ontario

AR-9

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:*

PROJECT TITLE:
"In Situ Electrostatic Precipitation on the Impact and Control of NO_x Emissions in Ontario"

KEY WORDS:
electrostatic precipitation, airborne particulates, silicon carbide manufactur

PRINCIPLE INVESTIGATOR AND AFFILIATION Prof. I.I. Inculet, Faculty of Eng. Science, University of Western Ontario

LIAISON OFFICER OR SUPERVISOR Mr. E.T. Barrow, Head, New Tech. & Process Evaluation Unit

RESEARCH CATEGORY:
INTERNAL —— *GRANT* X
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT ——
CONCURRENT PROJECT ——

OBJECTIVE:
To develop a system of corona injection and repelling electrodes adaptable to various industrial processes, which will reduce the total particulate emission to the environment.

DESCRIPTION:
A number of laboratory and field studies will be carried out to determine physical and aerodynamic properties of particles emitted from silicon carbide furnaces and to evaluate the feasibility of using the corona injectior system to charge the airborne particulates in situ and:

a) precipitating the particles back to the furnace
b) propelling the particles on to collecting grids above the furnace, or
c) concentrating particle streams into ventilation hoods to be collected by high efficiency, low volume precipitators.

DURATION OF PROJECT —— *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* ——

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$7,400.		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
No

REMARKS:

Ministry of the Environment

Ontario

AR-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:*

PROJECT TITLE: "Grape Respones to Air Pollution in Southern Ontario"

KEY WORDS: grapes, air pollution, ozone, PAN, sulphur dioxide

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. D.P. Ormrod, Ont. Agriculture College, Dept. of Horticultural Science, University of Guelph

LIAISON OFFICER OR SUPERVISOR Dr. Sam Linzon, Supervisor, Phytotoxicology Section

RESEARCH CATEGORY: *INTERNAL* — *GRANT* X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* X — *CONCURRENT PROJECT* —

OBJECTIVE:

1. To evaluate grape crop responses to air pollution in southern Ontario.
2. To correlate observed injury with oxidant monitor readings at several locations.
3. To determine the role that might be played by SO_2 either as a separate pollutant or in the presence of other pollutants.
4. To relate, as far as possible, grape responses to those of other crop plants in the vicinity, and to soil, climate and vineyard management practices.

DESCRIPTION:

The work will consist of an integrated series of experiments to be conducted in the field at several locations and in controlled exposure facilities. The programme is to include studies of the onset and severity of air pollution injury during the growing season, evaluation of yield effects by chemical protectant studies and observation of sulphur dioxide exposure effects.

DURATION OF PROJECT — *YEARS* *PRESENT YEAR IS* 3 *YEAR* *REPORTING DATE* —

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		$9,000.		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Ministry of the Environment
Ontario

AR-11

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:*

PROJECT TITLE:
"Assessment of Factors Influencing Losses to White Beans from Ozone in Ontario

KEY WORDS: white beans, ozone, yield losses

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. G. Hofstra, Dept. of Env. Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR Dr. Sam Linzon, Supervisor, Phytotoxicology Section

RESEARCH CATEGORY: *INTERNAL GRANT* X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:
1. Assess losses from ozone in various parts of the bean growing area in Ontario.
2. Relate losses to factors such as root rot, nitrogen levels, cropping histo
3. Devise means of reducing losses in beans from ozone.
4. To evaluate the potential of EDU as an anti-oxidant on white beans.

DESCRIPTION:

The program will involve establishing plots in farmers' fields. Field work will involve application of the protectant EDU and assessing ozone damage and root rot each time plants are sprayed. Also harvesting and yield determination at the end of the growing season. Then yield changes will be correlated with fertility, root rot and cultivar.

DURATION OF PROJECT ——— *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* ———

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$12,542.		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

Also funded by Department of Fisheries and Environment.

REMARKS:

Ministry of the Environment

Ontario

AR-12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:*

PROJECT TITLE: "The Feasibility of Monitoring Particulate Pollution in Hamilton for an Epidemiological Survey"

KEY WORDS: suspended particulates, epidemiology

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. L.D. Pengelly, Dept. of Medicine, McMaster University

LIAISON OFFICER OR SUPERVISOR Dr. R. Caton, Head, Hazardous Contaminants and Research Planning /Unit

RESEARCH CATEGORY: *INTERNAL GRANT* — X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:

To determine the relationship between particulate pollution and respiratory health effects.

DESCRIPTION:

The work program will involve the monitoring of suspended particulates in Hamilton, optimization of network design and performance and an investigation of the technology for indoor/outdoor measurements.

DURATION OF PROJECT ——— *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* ———

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		$25,000.		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* — X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

No

REMARKS:

Ministry of the Environment
Ontario

AR-13

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE:

PROJECT TITLE: "Point Monitoring Systems for Gaseous Pollutants by the Infrared Resonance Absorption Technique Using Tu nable Semiconductor Diode Lasers"

KEY WORDS: Gaseous pollutant, point monitoring, diode laser, IR absorption

PRINCIPLE INVESTIGATOR AND AFFILIATION Prof. J. Shewchun, Dept. of Engineering Physics, McMaster University

LIAISON OFFICER OR SUPERVISOR Dr. S. Gewurtz, Hazardous Contaminants and Research Planning Unit

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
To develop an economic point monitoring system for various gaseous pollutants based on the resonance infrared absorption technique using tu nable diode lasers as readiation sources.

DESCRIPTION:
1. Work program will involve expanding the capability in detecting SO_2, NO/NO CO and O_3 in the ppb range.
2. Construction of a prototype field instrument for MOE.
3. Continue laser source development and characterization.
4. Continue to examine calibration procedures - both for our own instrumentation and for the chemical analyzers being used in the field by the Ministry.
5. Begin investigations into detecting more uncommon pollutants such as PAN, HF, H_2S, PCB and to determine what detection capabilities can be achieved.

DURATION OF PROJECT —— *YEARS* *PRESENT YEAR IS* 4 *YEAR* *REPORTING DATE* ——

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$22,950.		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Ministry of the Environment

Ontario

AR-14

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE:

PROJECT TITLE: "An Initiation of an Investigation on the Impact and Control of NO_x Emissions in Ontario"

KEY WORDS: NO_x emissions, literature review, economic analysis

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. A.W. Gnyp, University of Windsor, Dept. of Chem. Engineering

LIAISON OFFICER OR SUPERVISOR Mr. E.T. Barrow, Head, New Tech. & Process Control Unit

RESEARCH CATEGORY: *INTERNAL GRANT* X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE: To provide an in-depth literature review of

i) the impact of NO_x emissions
ii) the location and distribution of sources of NO_x in Ontario
iii) potentially viable NO_x control methods
iv) engineering and economic feasibility of installing technology in Ontario.

DESCRIPTION:

The program would involve acquisition of literature surveys and on-site visits and critical reviews of all collected materials to establish the impact of NO_x emissions and to assess the applicability of various control technologies.

DURATION OF PROJECT ——— *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* ———

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		7,500.		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Ministry of the Environment
Ontario

AR-15

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:*

PROJECT TITLE: "Multielement Determination of Metals and Metal Compounds in Air Samples"

KEY WORDS: TVA-AFS, GC-AFS, multielement analysis, heavy metal compounds

PRINCIPLE INVESTIGATOR AND AFFILIATION Prof. J.C. VanLoon and Dr. L.R.P. Butler, Institute for Environmental Studies, U. of Toronto.

LIAISON OFFICER OR SUPERVISOR Dr. Maris Lusis, Head, Special Studies Unit

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
Using new equipment and multielement approach, to study metals and metal compounds in air samples.

DESCRIPTION:
Develop analytical methods for use of gas chromatography-atomic fluorescence spectroscopy and thermal volatilization atomic fluorescence spectroscopy to analyze metals in air. Demonstrate these procedures as applicable for routine air monitoring.

DURATION OF PROJECT ——— *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* ———

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$14,200.		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Ministry of the Environment
Ontario

AR-16

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:*

PROJECT TITLE: "Quantitative Spectroscopic Studies of the Aerosol and Molecular Contribution to the Extinction Properties of the Urban Haze with Specific Application to the Brown Atmospheric Haze"

KEY WORDS:
atmospheric absorption, nitrogen dioxide, spectroscopic studies, brown haze

PRINCIPLE INVESTIGATOR AND AFFILIATION Prof. R.W. Nicholls, Centre for Research Experimental Space Science, York University

LIAISON OFFICER OR SUPERVISOR Dr. S. Gewurtz, Hazardous Contaminants and Research Planning Unit

RESEARCH CATEGORY: *INTERNAL GRANT* — X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:
1. to make high resolution spectroscopic observations of the absorption properties of the atmosphere, particularily of nitrogen dioxide.
2. to elucidate the cause of the "brown haze".

DESCRIPTION:
Continuation of regular observations on the spectral extinction of daylight in the urban haze (particularily brown haze) over Toronto and quantitative diagnosis of conditions which exist in the hazes. Auxilliary data such as local meteorological conditions, sun angles, etc., will be recorded.

DURATION OF PROJECT ——— *YEARS* *PRESENT YEAR IS* 4 *YEAR* *REPORTING DATE* ———

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		$15,000.		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* — X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Ministry of the Environment

Ontario

AR-17

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:*

PROJECT TITLE:
"Trace analysis of Compounds Associated with Airborne Particulate Matter, and Incinerator Effluents"

KEY WORDS:
Gas Chromatograph, Mass Spectroscopy, Trace Analysis, Chlorinated hydrocarbons

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. F.W. Karasek, Dept. of Chemistry, University of Waterl

LIAISON OFFICER OR SUPERVISOR Dr. A. Foldes, Hazardous Contaminants & Research Planning Unit

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
To apply HP5992 GC/MS system and developed trace analysis techniques for a study of the types and quantities of compounds present in both solid and vapour emissions of incinerators.

DESCRIPTION:
Previous work has resulted in development of suitable GC & GC/MS/Computer instrumentation and analytical methods which give qualitative and quantitativ analyses of trace concentrations of complex organic mixtures. These methods are sufficiently rapid that survey studies at a given sampling site are practical. In addition to GC/MS, selected ion monitoring may be used to determine specific compounds with high sensitivity. Municipal incineration samples will be analyzed for chlorinated aromatic hydrocarbons and other species.

DURATION OF PROJECT —— *YEARS* *PRESENT YEAR IS* 1 —— *YEAR* *REPORTING DATE* ——

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$25,500.		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:
No

REMARKS:

G-18-78

AR-18

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES

DATE:

PROJECT TITLE: "The Preparation of Reference Compounds Required for Monitoring Purposes: Polyaromatic Hydrocarbons"

KEY WORDS: polycyclic aromatic hydrocarbons, synthesis, analysis, reference compound

PRINCIPLE INVESTIGATOR AND AFFILIATION Professor J.W. ApSimon, Carleton University

LIAISON OFFICER OR SUPERVISOR Dr. A. Foldes

RESEARCH CATEGORY: *INTERNAL GRANT* X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE: To provide MOE with useable amounts of selected pure reference compounds in the polycyclic aromatic hydrocarbon family; to improve upon existing methods of preparation and purification; to develop new synthetic pathways.

DESCRIPTION: Laboratory methods will be developed for the efficient synthesis of fraction-of-a-gram quantities of selected polycyclic aromatic hydrocarbons. Emphasis will be placed on the benzofluoranthenes (b,j,k). Development of laboratory protocol for handling carcinogenic substances.

DURATION OF PROJECT ——— *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* ———

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		16,200		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS: Project developed jointly with Laboratory Services Branch.

MINISTRY OF THE ENVIRONMENT

RESEARCH AND DEVELOPMENT INVENTORY

JC 7801

BRANCH Laboratory Services DATE March 2, 1978

PROJECT TITLE Batch Digestion Pretreatment and Automation of Neutralization Step for Simultaneous Determination of Total Phosphorus and Total Kjeldahl Nitrogen.

KEY WORDS Batch Digestion, Automated Neutralization, Water Samples, Analyses, Total Phosphorus, Total Kjeldahl Nitrogen

PRINCIPAL INVESTIGATOR AND AFFILIATION Joan Crowther, Project Scientist
Water Quality Section

LIAISON OFFICER OR SUPERVISOR S. Villard, Manager
Water Quality Section

RESEARCH CATEGORY					
	INTERNAL GRANT	✓	UNSOLICITED SOLICITED	✓	MULTI-YEAR CONCURRENT

OBJECTIVE To improve the efficiency of the current manual digestion procedure for total phosphorus and total Kjeldahl nitrogen determinations by introducing a semi-automated batch digestion pretreatment and automating the neutralization step.

DESCRIPTION

(SEE OVER)

STARTING DATE April 1, 1978 COMPLETION DATE April 1, 1979

BUDGET CURRENT YEAR 12,000 8,200 MAN YEARS 0.6

SOURCE OF FUNDS							
	REGULAR WORK PROGRAM	✓	SPECIAL MINISTRY FUNDING	___	JOINTLY FUNDED PROJECT	___	OTHER ___

REPORTING PROCEDURE Reports on Completion of Study for Process Water Group and for River Lab.

REMARKS

Over the past two years, four internal studies have prepared the way for the proposed project. First, a modified indophenol blue procedure for ammonia has been developed (Internal Report by J. Crowther and J. Evans dated March 27, 1977); the colorimetry was stablized with respect to pH by introducing a buffer, Second, the method was adapted for TKN analyses (Internal Report by J. Crowther and M. Hutt dated May 17, 1977). Third, the use of ascorbic acid as the reductant for total phosphorus determinations by molybdenum blue formation has been studied, and found to be less susceptible to pH changes and interference than the current procedure (Internal Report by J. Crowther and B. Wright in preparation). The improved pH stability for these two parameters should permit automating the neutralization step by partial neutralization of the digested samples in the AutoAnalyzer manifold prior to colorimetric analyses. It is presumed that small pH differences arising from the sample matrix and the digestion procedure will not affect the final results. Preliminary experiments have indicated that in-line neutralization is feasible for the Sewage laboratory.

The fourth study (Memo to S. Villard from J. Crowther and K. Gordon dated Nov. 18, 1977) showed that the current digestion procedure does not recover Kjeldahl nitrogen as completely as the classical procedure (Env. Sci. & Tech. 10, 1038, 1976). The digestion procedure outlined in the foregoing paper is a semi-automated technique capable of recovering isonicotinic acid; this procedure will be adapted to our needs.

If the planned study is successfully completed, it will require purchase of block digesters, but it will undoubtedly improve productivity.

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If the planned study is successfully completed, it will require purchase of block digesters, but it will undoubtedly improve productivity.

Ministry of the Environment
Ontario

MINISTRY OF THE ENVIRONMENT

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch

DATE: March 2, 1978

PROJECT TITLE: Determination and Identification of chloro-dibenzodioxins and chloro-dibenzofurans in environmental samples.

KEY WORDS: Analysis, identification, dioxins, furans, GC/MS.

PRINCIPLE INVESTIGATOR AND AFFILIATION: Pesticides Section.

LIAISON OFFICER OR SUPERVISOR: G. A. V. Rees

RESEARCH CATEGORY: INTERNAL —— GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE: Considering the number of recent fires involving PCB-containing transformers, the fact that PCB's may produce chloro-dioxins and -furans at hi temperatures and that these compounds are highly toxic, it becomes imperative that the laboratory develop analytical procedures for the identification and quantitation of chlorodioxins and chlorofurans. These compounds are also present as impurities in a number of herbicidal formulations, thus increasing their potential for environmental contamination.

DESCRIPTION: The project will involve the valuation of: extraction methods for the chlorodioxins and chlorofurans from various matrices - chromatographic procedures for the clean-up of the extracts and separation of these compounds from PCB's - followed by identification and quantitation by gas chromatography -mass spectrometry. Once the method development stage is complete within six months, the Pesticides SEction will be in a position to evaluate the potential health hazards resulting from fires and explosions involving transformers and other PCB-containing products.

DURATION OF PROJECT: ——— YEARS

PRESENT YEAR IS: ——— YEAR

REPORTING DATE: ———

BUDGET: $20,000

TOTAL DOLLARS: TOTAL PROJECT / CURRENT YEAR

MAN YEARS: TOTAL PROJECT / CURRENT YEAR: 0.50

SOURCE OF FUNDS: REGULAR WORK PROGRAM —— SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED?

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

LS-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services, OTC Section

DATE: Sept. 1978

PROJECT TITLE: Organic Vapour Contaminants in Ambient Air, Part 1.

KEY WORDS: Ambient Air; Organic Contaminants, Hydrocarbons; Industrial Emissions; Sampling; Gas Chromatography; Adsorption, Survey.

PRINCIPLE INVESTIGATOR AND AFFILIATION: E. G. Adamek

LIAISON OFFICER OR SUPERVISOR: Dr. O. Meresz

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE: To establish procedures suitable for the routine sampling and analysis of organic vapour contaminants in ambient air samples. To survey such contaminants by analysis of air samples taken close to selected industries.

DESCRIPTION: Air Resources Branch have initiated a program aimed at surveying organic contaminants in urban and industrial atmospheres. As the first target, sites in Sarnia near various chemical industries were chosen for exploring the feasibility of ambient air surveys with newly developed sampling and analytical techniques.

The general approach will be to explore and optimize sampling procedures (for concentrating contaminants). Further to establish analytical procedures as required, which may involve desorption and gas chromatographic techniques for effecting separation, identification and quantitation of major organic contaminants in ambient air.

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS 2nd YEAR — REPORTING DATE: Jan. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$20,000	$10,000	1.0	.5

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

LS-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, O.T.C. Section *DATE:* September, 1978

PROJECT TITLE:
Chlorination of Benzene, Toluene, Xylene and Styrene in Water.

KEY WORDS: Chlorination, sewage treatment, aromatic hydrocarbons.

PRINCIPLE INVESTIGATOR AND AFFILIATION B. Shushan

LIAISON OFFICER OR SUPERVISOR O. Meresz

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To investigate the halogenated organics formed through chlorination of the title compounds, in aqueous solution.

DESCRIPTION:

The potential for formation of chlorinated aromatics from chlorination of their hydrocarbon analogue may have damaging environmental consequences because of their increased toxicity of these chlorinated compounds. Project OM-7703 has demonstrated that chlorination of biphenyl can produce PCBs. This project will examine some monoaromatic ring compounds commonly found in sewage, and their chlorination potential.

Chlorination of aqueous solutions of benzene, toluene, xylene and styrene will be studied. Detailed analysis of the chlorinated components will be determined by gas chromatography/ mass spectrometry. The kinetics in aqueous solution will be carried out.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* June, 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$12,000	$5,000	0.5	0.1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

IS-5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, O.T.C. Section *DATE:* September, 1978

PROJECT TITLE:

Chlorination of Biphenyl in Water

KEY WORDS:

PCB, biphenyl, chlorination, sewage treatment

PRINCIPLE INVESTIGATOR AND AFFILIATION: B. Shushan

LIAISON OFFICER OR SUPERVISOR: O. Meresz

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To investigate the halogenated biphenyls formed through the chlorination of biphenyl in aqueous solution.

DESCRIPTION:

The potential for formation of PCBs from the chlorination of biphenyl has been demonstrated (OTC Project No. OM 7701)

Chlorination of aqueous solutions of biphenyl will be carried out. Detailed analysis of the PCB composition will be carried out by gas chromatography/mass spectrometry. The kinetics of the chlorination reaction will be studied.

DURATION OF PROJECT: 2 YEARS *PRESENT YEAR IS:* 2nd YEAR *REPORTING DATE:* June 1979.

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$12,500	$2,500	0.6	0.2

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

RESEARCH AND DEVELOPMENT INVENTORY

LS-6

BRANCH: Laboratory Services

DATE: 29/9/78

PROJECT TITLE:
Analysis of metals in vegetation by X-ray fluorescence spectrometry

KEY WORDS: metals, vegetation, XRF

PRINCIPLE INVESTIGATOR AND AFFILIATION: J.A. Pimenta, P.J. Roberts MOE

LIAISON OFFICER OR SUPERVISOR: A.C. Rayner M.O.E

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:
To develop a rapid and inexpensive method to analyse metals in vegetation by XRF

DESCRIPTION: The recognition of pollution damage to vegetation requires the analysis of a large number of samples for many parameters

X-ray fluorescence spectrometry offers an opportunity to perform multi-element analysis in vegetation samples with a minimum of sample preparation. The project will deal with establishing calibration curves for various metals in vegetation and to prepare computer programs to correct for inter-element effects.

DURATION OF PROJECT: one YEARS — PRESENT YEAR IS ~~1st~~ YEAR — REPORTING DATE: April 1979

BUDGET: $20,000 — TOTAL DOLLARS: TOTAL PROJECT — CURRENT YEAR — MAN YEARS: TOTAL PROJECT 1 yr. — CURRENT YEAR

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

RESEARCH AND DEVELOPMENT INVENTORY

LS-7

BRANCH: LABORATORY SERVICES

DATE: October 3, 1976

PROJECT TITLE: Further Testing of the Interim Method for the Determination of Asbestos Fibres in Water by TEM, prepared by the MOE Committee on Asbestos Analysis

KEY WORDS: Asbestos, chrysotile, amphibole, talc, TEM, Nuclepore filters, Millipore filters, low temperature ashing

PRINCIPLE INVESTIGATOR AND AFFILIATION: W.L.Dicker, Physical Methods Section

~~XXXXXXXXXX~~ OR SUPERVISOR: A.C.Rayner

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT X — CONCURRENT PROJECT —

OBJECTIVE:
To determine the recovery of asbestos fibres in a suspension of known mass concentration using the interim method developed by the MOE Asbestos Committee, both with and without ashing; to determine the stability of the suspension and the effect of adding an interfering agent (talc) to the suspension.

DESCRIPTION:
Use known amounts of UICC chrysotile or crocidolite to prepare suspensions of these fibres in filtered tap water. Prepare dilutions of the suspensions and filter 12 aliquots for each of the following tests for each of chrysotile and crocidolite:

1) % recovery of the interim method without ashing.
2) % recovery of the interim method with ashing.
3) Stability of the suspensions over a period of 2 weeks.
4) % recovery of the interim method without ashing when talc is added as an interfering agent.

Also, perform 6 tests for blank level determination.

For all tests, determine the number and mass concentrations of the fibres in the suspensions by means of the interim method.

DURATION OF PROJECT: 1.5 YEARS — PRESENT YEAR IS 78/79 YEAR — REPORTING DATE: Sept 78 & Apr

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$34,850	$18,650	1·5	0·5

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

None

REMARKS: The second draft of the report on the first part of the project has been prepared i.e. % recovery of the interim method without ashing for chrysotile. During the course of the tests, a 'stratified' counting procedure was developed which improved the precision and accuracy of the results obtained and this procedure is described in the report.

MOE 1293 6/76

Ministry of the Environment
Ontario

LS-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch , O.T.C. Section

DATE: September, 1978

PROJECT TITLE:

Active Tagging of Gasolines for Source Identification

KEY WORDS: Gasoline, identifications, active tagging, aquifer, musks.

PRINCIPLE INVESTIGATOR AND AFFILIATION B. Shushan, T. Sakuma

LIAISON OFFICER OR SUPERVISOR O. Meresz

RESEARCH CATEGORY: *INTERNAL* X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To find compounds that are suitable for use in active tagging of gasolines. To use these compounds in field tests to identify sources of gasoline contamination.

DESCRIPTION:

Gasoline leaks from underground tanks is a frequent occurrence in Ontario. At present, there is not a suitable tracer for these gasolines. In most cases, the gasoline is too badly "weathered" to allow passive tagging. At present, the tanks must be dug up and pressure tested at considerable cost to the Ministry.

A number of organic compounds will be evaluated as active tagging materials. The compounds must be easily identified in the presence of gasoline, safe to use, and reasonably resistant to degradation in the aquifer.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* February, 1979

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$12.5	$2.5	0.5	0.1

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MINISTRY OF THE ENVIRONMENT

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH Laboratory Services DATE December 2, 1977

PROJECT TITLE Analytical Methods Development for the Detection and Quantitation of Mutagenic Activity in Environmental Samples.

KEY WORDS Analyses, Methods, Mutagenic, Carcinogenic, 'Ames' test, Environment, Water, Effluents, Sediments, Concentration, Screening

PRINCIPAL INVESTIGATOR AND AFFILIATION D. A. Rokosh, Ministry of the Environment

LIAISON OFFICER OR SUPERVISOR J. A. Clark, L. T. Vlassoff

RESEARCH CATEGORY	INTERNAL GRANT	UNSOLICITED SOLICITED	MULTI-YEAR CONCURRENT

OBJECTIVE Bacteriological and mycological(yeast) mutagenesis assays will be modified for use on environmental samples. The detection limits of these assays will be determined. Methods for concentration of mutagenic substances from samples containing levels >1 ug/ml will be developed. Screening techniques for mutagenic activity will be developed to lower time and cost of analyses.

DESCRIPTION Approximately 500 samples, including effluents, waters and sediments, originating from the St. Clair River and known to contain organic chemical pollutants, will be analysed by bacterial and yeast mutagenesis assays. The most suitable microbiological assay(s) will be selected. Assays for mutagenic screening and quantitative mutagenic activity will be developed. The detection limits of the assay will be determined by comparing mutagenic activity with the chemical composition of these samples. Methods for concentration of organic chemicals from these samples will be aimed at lowering the detection limits of these assays.

STARTING DATE March, 1978 COMPLETION DATE March, 1980

BUDGET CURRENT YEAR 59,000 24,000 plus 10,000 capital MAN YEARS 2.4

SOURCE OF FUNDS	REGULAR WORK PROGRAM ___	SPECIAL MINISTRY FUNDING ___	JOINTLY FUNDED PROJECT ___	OTHER ___

REPORTING PROCEDURE Interum Report, Annual Report, Final Report, Methods Manual

REMARKS The Organic Trace Contaminants and Pesticides Sections would be involved in methods development and chemical analyses.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE:
Activity and persistence of some organophosphorus, carbamate, and pyrethroid insecticides in soil

KEY WORDS: Insecticide effectiveness, insecticide persistence, soil, organo phosphate, carbamate, pyrethroids

PRINCIPLE INVESTIGATOR AND AFFILIATION
Drs. R. A. Chapman and H. J. Svec
University of Western Ontario

LIAISON OFFICER OR SUPERVISOR
Ontario Pesticides Advisory Committee

RESEARCH CATEGORY:
INTERNAL —— *UNSOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* ——
GRANT X *SOLICITED CONTRACT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To assess in laboratory and field studies: a) the effectiveness of selected organophosphorus, carbamate, and pyrethroid insecticides for onion maggot control; and b) the persistence of these insecticides in soil.

DESCRIPTION:

Pyrethroid insecticides: Studies will be continued in the laboratory to determine: if the persistence of the pyrethroid insecticides in soil is concentration dependent; if soil moisture influences persistence; the rate of disappearance of the various stero- and geometric isomers present in the soil. Field studies on the persistence of the pyrethroids in mineral and organic soil will be completed.

Organophosphorus and carbamate insecticides used for onion maggot control: Greenhouse tests on the effectiveness and persistence of experimental insecticides which may have potential for onion maggot control will be completed. Field studies set up to monitor the accumulation of insecticide residues in organic soil from year to year as a result of annual seed furrow treatments at rates recommended for onion maggot control will be continued.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* Progress report December - 1978

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$ 20,600	$9,700		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? first year progress report received. Second year progress report due December, 1978

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE: The dynamics and persistence of the herbicide diquat in the freshwater environment

KEY WORDS: Aquatic herbicide persistence Diquat Fresh water

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. B. Colman
Dept. of Biology, York University

LIAISON OFFICER OR SUPERVISOR: Ontario Pesticides Advisory Committee

RESEARCH CATEGORY:
INTERNAL ___ *GRANT* X *UNSOLICITED CONTRACT* ___ *SOLICITED CONTRACT* ___ *MULTI-YEAR PROJECT* ___ *CONCURRENT PROJECT* ___

OBJECTIVE:

To determine the dynamics, persistence and potential residual toxicity of the aquatic herbicide diquat in fresh water ecosystems.

DESCRIPTION:

Model laboratory aquatic ecosystems consisting of tanks lined with polyethylene containing two types of lake sidiment differing in organic carbon content and aquatic flora will be established. Radioactive herbicide will be applied to each of these systems and the initial rate of binding to the sediment and plant material will be followed.
Relative rates of uptake by different plant groups and the residual phytotoxicity of the two sediment types will be determined.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress report December 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$ 7,600	$7,600		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X *SPECIAL MINISTRY FUNDING* ___ *JOINTLY FUNDED PROJECT* ___ *OTHER* ___

IS A REPORT ANTICIPATED? Report to be submitted December 1978

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE: Biological production of biphenyls and azobenzenes from chlorinated anilines residues from certain herbicides

KEY WORDS: biphenyls azobenzenes

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. C. T. Corke
Dept. of Environmental Biology, University of Gcelph

LIAISON OFFICER OR SUPERVISOR: Ontario Pesticides Advisory Committee

RESEARCH CATEGORY:
INTERNAL GRANT X
UNSOLICITED CONTRACT —
SOLICITED CONTRACT —
MULTI-YEAR PROJECT —
CONCURRENT PROJECT —

OBJECTIVE:

To determine the factors related to the biological production of biphenyls and azobenzenes

DESCRIPTION:

To examine the diversity of bacterial species in soil, sediment, and sewage that are capable of carrying out the synthesis of biphenyls and azobenzenes during the degradation of phenylamide, phenylcarbamate and phenylurea herbicides

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress report December 1978

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$ 5,000	$ 5,000		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING —
JOINTLY FUNDED PROJECT —
OTHER —

IS A REPORT ANTICIPATED? Report required annually

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE: The behavioral effects of sublethal doses of aquatic herbicides on the rheotropic response of rainbow trout

KEY WORDS: Aquatic herbicides sublethal doses rainbow trout

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. J. J. Dodson
Dept. of Biology, University of Waterloo

LIAISON OFFICER OR SUPERVISOR: Ontario Pesticides Advisory Committee

RESEARCH CATEGORY:
INTERNAL —— *GRANT* X
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To assess the bioaccumulation of aquatic herbicides in fish tissues;

To measure the behavioral toxicology of 2,4-D butoxyethanol ester and to examine toxicity patterns of other aquatic herbicides to exposed fish.

DESCRIPTION:

Herbicides to be utilized in this study include 2,4-D butoxyethanol ester (Aqua-Kleen), terbutryn, dalapon, amino-triazole and paraquat.

DURATION OF PROJECT: 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress report December 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$ 14,900	$ 8,900		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? Report required annually

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE:
THE ECONOMIC SIGNIFICANCE OF POTATO LEAFHOPPERS IN NEW SEEDINGS OF ALFALFA

KEY WORDS: Potato leafhoppers Alfalfa Economic threshold

PRINCIPLE INVESTIGATOR AND AFFILIATION
Dr. C. R. Ellis
Dept. of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR
Ontario Pesticides Advisory Committee

RESEARCH CATEGORY:
INTERNAL GRANT — X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:
To determine the effect of leafhoppers on alfalfa yields and on protein content in the first year after planting and thereby establish an economic threshold.

DESCRIPTION:
There are no Ontario data on the economic losses caused by the potato leafhopper on alfalfa, yet pesticides are being used. The cooperators will be farmers who have suspected a potato leafhopper problem on their alfalfa or who have applied pesticides against this pest in the past. Methoxychlor will be used in a single application to control leafhopper on part of each new seeding of alfalfa, and populations of potato leafhoppers will be assessed two to three times on both the sprayed and non-sprayed areas of each farm. The research will consider the economics of this single, timed application because the assumption, based on American data, is that additional treatments will not be economical. At harvest both treated and non-treated areas of all fields will be sampled to determine the quality and quantity of forage. Samples of material will be taken for dry weight and protein analysis. Because potato leafhoppers are assumed to influence quality and quantity of forage the following year the plant stand and yield will be determined for two years.

DURATION OF PROJECT — 2 — *YEARS* *PRESENT YEAR IS* — 1st — *YEAR* *REPORTING DATE* Progress report December 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	Approx. $ 18,000	$ 9,900		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM — X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE: Reduction of fungicide usage on vegetable crops by timing fungicide applications according to weather data

KEY WORDS: Fungicides Timing by weather data

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. T. J. Gillespie and Dr. J. C. Sutton
University of Guelph

LIAISON OFFICER OR SUPERVISOR Ontario Pesticides Advisory Committee

RESEARCH CATEGORY:
INTERNAL —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

1. To test the reduced spray scheme in field plots for a third season.
2. To examine the role of rain in promoting disease development.
3. To elucidate the effects of intermittent leaf surface wetness on infection of onions by B. Squamosa.
4. To define the role of ozone as a factor in enhancing blight severity.

DESCRIPTION:

1. We feel that our scheme for reducing fungicide applications to onions should be tested in at least three seasons to establish sufficient confidence for larger scale use in growers' fields. Weather factors will be monitored.
2. Rain appears to promote onion leaf blight and make effective control of the disease difficult. However, rain occurrence may also offer an alternative parameter to leaf wetness duration for practical timing of fungicide applications.
3. Study the effects of 'short dry periods' on the survival of B. squamosa spores and sporelings on onion leaves under controlled environment.
4. Ozone has been shown to enhance the severity of Botrytis leaf blight in the field and in open-top chambers in the field (Wukasch and Hofstra, 1977). We wish to examine the effects of ozone on disease development in controlled environment, with special reference to infection processes and other aspects pertinent to the strength and dependability of the reduced fungicide spray scheme.

DURATION OF PROJECT 6 *YEARS* *PRESENT YEAR IS* 6th *YEAR* *REPORTING DATE* Progress report December 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$ 49,753	$ 10,300		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Report required annually

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE: Effects of insect growth regulators on emergence of black fly larvae and on non-target aquatic invertebrates

KEY WORDS: Growth regulators, black fly larvae, aquatic invertebrates

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. N. K. Kaushik
Dept. of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR: Ontario Pesticides Advisory Committee

RESEARCH CATEGORY:
INTERNAL GRANT X
UNSOLICITED CONTRACT —— *MULTI-YEAR PROJECT* ——
SOLICITED CONTRACT —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To study the effect of Altosid SR-10, Dimilin 25 WP and other IGRs on blackfly larvae and associated non-target organisms

DESCRIPTION:

a) Determine the effect of the IGRs on target species like Simulium vitatum, Prosimulium sp. and Simulium venustum

b) Determine the susceptibility of different instars to Altosid SR-10 and other IGRs

c) Evaluation of methods of treatment and dosage required through field tests

d) Study the effects on non-target organisms under laboratory and field conditions.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress report December 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$ 15,200	$ 9,200		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? A report will be submitted to the Committee

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE:
DIQUAT IN AQUATIC SYSTEMS

KEY WORDS: Diquat Aquatic systems Sediments

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. C. I. Mayfield
Dept. of Biology, University of Waterloo

LIAISON OFFICER OR SUPERVISOR Ontario Pesticides Advisory Committee

RESEARCH CATEGORY:
INTERNAL GRANT X
UNSOLICITED CONTRACT —
SOLICITED CONTRACT —
MULTI-YEAR PROJECT —
CONCURRENT PROJECT —

OBJECTIVE:

To determine the adsorption capacity of different lake sediment types, the degradation rate of diquat in these sediments, the rate of transfer of diquat from water to sediment, the transfer rate of diquat from sediment to water, and the effect of the resuspension of sediment carrying adsorbed diquat on certain biological processes and water quality.

DESCRIPTION: Diquat (Reglone A^{R}) is registered for use on mixed submergent aquatics in ponds and lakes and for emergent duckweed.

The fate of diquat accumulations in sediments depends upon such factors as the substrate to which diquat is adsorbed, the concentration present, its effect on biological processes, the oxygen tension in the sediment, diquat mobility in sediments, and the form in which diquat enters the sediment (as a solution or adsorbed onto organic or inorganic materials).

Subsequent release of diquat from such sediments will depend upon the concentration of ions in the water (resuspension on particles) any biodegradation and hootochemical degradation that has occurred, the mobility of diquat (or its breakdown products, if any), in the sediment.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress report due December 1978

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
?	$ 7,200		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING —
JOINTLY FUNDED PROJECT —
OTHER —

IS A REPORT ANTICIPATED? Progress report required annually

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE:
Optimum methods for sterile male control of the onion maggot Hylemya antiqua Meigen

KEY WORDS: Onion maggot control Sterile male

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. F. L. McEwen
Dept. of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR Ontario Pesticides Advisory Committee

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
To develop recommendations for the use of sterile male control of the onion maggot in Ontario

DESCRIPTION:
To produce 1.5 million sterile males of two cultures of H. antiqua. Sterility to be produced by two methods, gamma radiation, and the chemosterilant, Hempa. Releases will be made in the Keswick Marsh. Competitiveness, survival and dispersion will be studied as well as control of the onion maggot.

DURATION OF PROJECT 6 *YEARS* *PRESENT YEAR IS* 6th *YEAR* *REPORTING DATE* Progress report December 1978

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$135,891	$ 32,400		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Progress report required annually

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE:
THE ECOLOGY OF SUBTERRANEAN TERMITES IN ONTARIO

KEY WORDS: Subterranean termites Distribution Biology

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. D. H. Pengelly
Dept. of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR Ontario Pesticides Advisory Committee

RESEARCH CATEGORY:
INTERNAL —— *GRANT* X
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT ——
CONCURRENT PROJECT ——

OBJECTIVE:
To determine the distribution of the subterranean termite in Ontario and to forecast future spread. Additional biological information will be sought to assist in designing future control programs.

DESCRIPTION:
Termites are increasing in importance as pests of wooden structures in Ontario. These insects have existed for many years in the southern part of the province before being detected. In 1977, well established colonies were found in Elora and Fergus. Little information is available on the biology of this pest in Ontario. It is not known how the species spreads, how far it spreads, what its parasites, predators and diseases are, or if any of these can be used in a control programme. There is no doubt what pesticides will kill the termite. More information of its biology is needed before the most effective timing and application of controls can be practised.

DURATION OF PROJECT 1-2 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress report December 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	?	$ 7,500		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? Progress report required annually

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE:
BAITED INSECTICIDES FOR CONTROL OF ADULT CABBAGE MAGGOTS ON RUTABAGAS

KEY WORDS: Baited insecticides Cabbage maggot

PRINCIPLE INVESTIGATOR AND AFFILIATION
Dr. M. K. Sears
Dept. of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR
Ontario Pesticides Advisory Committee

RESEARCH CATEGORY:
INTERNAL —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To determine the attractiveness of several combinations of chemicals for their possible use as insecticide baits, to assess the efficacy and longevity of baited insecticides in reducing adult cabbage maggots and larval damage to rutabagas and to assess the need for predictive techniques in applying baited insecticides for control of adult cabbage maggots.

DESCRIPTION:

Laboratory Studies - Several known attractive chemicals and nutrient materials will be tested, individually and in combination, for their ability to attract adult cabbage maggots in an olfactometer.

A number of insecticides currently used for control of dipterous adults will be tested for their toxicity against cabbage maggot adults. Those most effective will be mixed with bait materials and tested for attractiveness in a controlled environment.

Field tests of suitable baited insecticides will utilize one acre (.405 ha) plots in which the baited materials will be applied to areas treated by the grower with soil insecticides for maggot control on a normal schedule. Sticky traps and cone traps will be employed in treatment and check plots to monitor the reduction in adult flight activity and the duration of this decreased activity.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress report December 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$ 7,000	$ 7,000		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Progress report required annually

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE:
Development of effective monitoring techniques and control programs for insect pests attacking vegetables grown in the Thedford Marsh

KEY WORDS: Pest monitoring Onion maggot Vegetable crops Thedford marsh

PRINCIPLE INVESTIGATOR AND AFFILIATION
Dr. H. J. Svec and Dr. J. R. W. Miles
University of Western Ontario

LIAISON OFFICER OR SUPERVISOR
Ontario Pesticides Advisory Committee

RESEARCH CATEGORY:
INTERNAL —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
The development of effective monitoring techniques and control programs for insect pests attacking vegetables grown in the Thedford Marsh. Because of the severity of the problem the onion maggot will receive first priority. Preliminary data on the biology and control of cutworms, thrips and the Colorado potato beatle will also be compiled.

DESCRIPTION:
To obtain data on: the biology of the onion maggot in the Thedford Marsh and its behaviour relating to the different varieties of onions grown, crop loss estimates on onion maggot damage occurring in the absence of insecticide treatments, the value of current onion maggot control recommendations and to test alternative methods of chemical control, levels of insecticide residues in Thedofrd Marsh farm soils, residues in crops resulting from current control recommendations, and residues in crops resulting from experimental control programs tested, and to advise growers (through cooperation with OMAF) as to initiation and timing of adulticide sprays for onion maggot control.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress report December 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	approx. $18,000	$ 9,000		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Progress report required annually

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE:
FEASIBILITY OF USING THE LITTERBAG TECHNIQUE AS AN INDEX OF THE ENVIRONMENTAL IMPACT OF SOIL INSECTICIDES OF THE SOIL FAUNA

KEY WORDS: Soil insecticides soil fauna litterbag technique

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. A. D. Tomlin, University of Western Ontario

LIAISON OFFICER OR SUPERVISOR: Ontario Pesticides Advisory Committee

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To develop the litterbag technique as a method of determining the impact of pesticide use on soil fauna

DESCRIPTION:

Baseline decomposition rates for three agricultural systems have been obtained showing that the litterbag technique can discriminate between decomposition rates among various mesh bag sizes and leaf types. The technique appears sensitive enough to detect changes between insecticidally treated areas and non treated areas.

Analytical studies on decomposition rates will continue.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress report December 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$19,000	$11,000		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Progress report required annually

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE: MICROBIAL DEGRADATION OF PYRETHROID INSECTICIDES IN SOIL

KEY WORDS: Pyrethroid soil micro-organisms degradation

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. C. M. Tu and Dr. R. A. Chapman
University of Western Ontario

LIAISON OFFICER OR SUPERVISOR: Ontario Pesticides Advisory Committee

RESEARCH CATEGORY: *INTERNAL GRANT* X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:

1. To determine if, and to what extent, pyrethroid insecticides are degraded by soil microorganisms.
2. To determine the pathways of degradation and identify the important residues.
3. To identify the soil microorganisms involved.

DESCRIPTION:

Using techniques previously developed by the authors for other work on the persistence and microbial degradation of insecticides in soil, laboratory studies will be carried out to determine the rate at which 5 pyrethroid insecticides (permethrin, WL 41706, WL 43467, WL 43775, and FMC 45498) degrade in pasteurized and non-pasteurized mineral and organic soil. The relative rate of degradation of the "parent material" and identifiable isomers will be studied over a period of several months. Parallel microbiological studies will be done to assess numbers and types of microorganisms in the soil. If soil microorganisms do have an important role in pyrethroid degradation, the more important will be cultured and identified.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress report December 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$ 16,200	$ 9,000		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Progress report required annually

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE:

THE EFFECT OF PESTICIDES UPON THE GROWTH OF NERVE ENDINGS

KEY WORDS: nerve sprouting inhibition

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. C. J. Turner
Dept. of Biomedical Sciences, University of Guelph

LIAISON OFFICER OR SUPERVISOR: Ontario Pesticides Advisory Committee

RESEARCH CATEGORY: *INTERNAL GRANT* X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:

To develop a mammalian model to permit the study and quantification of collateral nerve sprouting.
To determine with the model of collateral nerve sprouting (1) the ability of pesticides to inhibit this process.
To determine the dose level at which any pesticide is effective at inhibiting collateral nerve sprouting.

DESCRIPTION:

Pesticides, mainly in the form of herbicides, insecticides, fungicides and nematocides, are used widely in Canadian agriculture. However, by their nature, these compounds are toxic and present hazards especially to agricultural workers and livestock. In particular, many of the pesticides in common use are neurotoxic as evidenced by the clinical symptoms including muscle weakness and paralysis, depression, incoordination, tremor and convulsions.

DURATION OF PROJECT ? *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress report December 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$1,100		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Progress report required annually.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE:
THE BIOLOGY AND CONTROL OF MOSQUITOES AND OTHER BITING FLIES IN ONTARIO

KEY WORDS: Mosquitoes | Mosquito biology | Mosquito control

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. G. A. Surgeoner, Dept. of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR: Ontario Pesticides Advisory Committee

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
To provide for the Ministry and the Ontario public:

1. A research competence in the subject area to study problem species and develop methods to deal with them.
2. Advice on appropriate control measures
3. Work with the Ministry in assisting municipalities in the development and implementation of effective mosquito abatement programs.

DESCRIPTION:
1. To maintain up-to-date information on the effectiveness of promising new insecticides, both larvicides and adulticides, for biting fly control and to assess their environmental impact under Ontario conditions.
2. To increase the effectiveness of mosquito control programs in Ontario.
3. To reduce the environmental impact of mosquito control by chemical means in Ontario.
4. To monitor for the development of insecticide resistance in mosquitoes so that recommendations will be effective.
5. To study the biology of selected mosquitoes in Ontario as a basis for improved methods and guidelines for control.
6. To conduct what research is necessary to develop effective methods for reducing nuisance problems with blackflies and other biting flies.
7. To evaluate control devices promoted for consumer use.

DURATION OF PROJECT: continuing *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* Progress report December 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$ 50,000		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Progress report required annually

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:
Evaluating this continuing study is now a responsibility of the Pesticides Advisory Committee.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE:

Vertebrate pests in Ontario, their importance, ecology and control (Blackbird study)

KEY WORDS: Mesurol; Redwinged blackbirds; 4-aminopyridine

PRINCIPLE INVESTIGATOR AND AFFILIATION: Drs. L. W. Kannenberg, F. F. Gilbert and L. V. Busch, University of Guelph

LIAISON OFFICER OR SUPERVISOR: Ontario Pesticides Advisory Committee

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To assess extent of bird damage to corn in Ontario

To devise means for minimizing bird damage to corn

DESCRIPTION:

Third year assessment of bird damage to corn, effectiveness of 4-aminopyridine and Mesurol on reducing damage, environmental impact of chemical treatments and ecological studies on reducing blackbirds

DURATION OF PROJECT —— *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* Progress report December 1978

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$ 170,000		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Progress report required annually

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

This study was initially funded through the Mammalian and Avian Pest Management Committee.

Responsibility for review has been assigned to the Pesticides Advisory Committee.

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL

DATE: May 30, 1978

PROJECT TITLE:

ASSESSMENT OF PAIN AND DISTRESS CAUSED BY VERTEBRATE PESTICIDES

KEY WORDS: Vertebrate pesticides, rodenticides, avicides, pain and distress

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. H. C. Rowsell
Dept. of Pathology, University of Ottawa

LIAISON OFFICER OR SUPERVISOR: Ontario Pesticides Advisory Committee

RESEARCH CATEGORY:

INTERNAL GRANT	X	*UNSOLICITED CONTRACT*	——
		SOLICITED CONTRACT	——
MULTI-YEAR PROJECT	——		
CONCURRENT PROJECT	——		

OBJECTIVE:

To evaluate the ability of vertebrate pesticides to produce a humane death in target species

DESCRIPTION:

Registered rodenticides and avicides will be administered to test animals at lethal doses. Based on criteria established by the researcher, humane death will be measured by the time taken for the loss of consciousness rather than by reflex movements after the loss of consciousness.

This study was originally funded through The Mammalian and Avian Pest Management Committee.

DURATION OF PROJECT: 3 *YEARS* — *PRESENT YEAR IS* 3rd *YEAR* — *REPORTING DATE:* Progress report December 1978

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$ 35,000	$ 12,000		

SOURCE OF FUNDS:

REGULAR WORK PROGRAM	X	*SPECIAL MINISTRY FUNDING*	——	*JOINTLY FUNDED PROJECT*	——
OTHER	——				

IS A REPORT ANTICIPATED? Progress report required annually

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE:

A STUDY OF DIFFERENT METHODS OF CONTROLLING BATS

KEY WORDS: Bat control D.D.T. Polybutenes

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. M. B. Fenton
Dept. of Biology, Carleton University

LIAISON OFFICER OR SUPERVISOR Ontario Pesticides Advisory Committee

RESEARCH CATEGORY:
INTERNAL GRANT X
UNSOLICITED CONTRACT —
SOLICITED CONTRACT —
MULTI-YEAR PROJECT —
CONCURRENT PROJECT —

OBJECTIVE:

To evaluate different means of controlling bats in buildings, thus minimizing contact between bats and people.

DESCRIPTION:

The study includes examination of:-

- the effectiveness of pesticide application in bat control including study of colonies sprayed with D.D.T. in previous years and one colony which would be sprayed during the study.
- the effectiveness of using polybutenes in bat-proofing buildings.
- the effectiveness of sealing buildings to exclude bats.
- an assessment of changes in bat behaviour patterns associated with different control techniques.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress report December 1978

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$ 9,500	$ 9,500		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING —
JOINTLY FUNDED PROJECT —
OTHER —

IS A REPORT ANTICIPATED? Progress report required annually

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE:
ARBORETUM RESEARCH RELATED TO ENVIRONMENTAL CONCERNS

KEY WORDS: Arboretum Land reclamation

PRINCIPLE INVESTIGATOR AND AFFILIATION
Ms. S. B. Lowe
Guelph Arboretum, University of Guelph

LIAISON OFFICER OR SUPERVISOR
Ontario Pesticides Advisory Committee

RESEARCH CATEGORY:
INTERNAL GRANT X
UNSOLICITED CONTRACT —
SOLICITED CONTRACT —
MULTI-YEAR PROJECT —
CONCURRENT PROJECT —

OBJECTIVE:
A study of landform alterations and establishment of plant species and sub-species of value in land reclamation

DESCRIPTION:
The Pesticides Advisory Committee was given the responsibility for overseeing this study in 1978-79.

DURATION OF PROJECT ——— *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$ 60,000		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM —
SPECIAL MINISTRY FUNDING X
JOINTLY FUNDED PROJECT —
OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 30, 1978

PROJECT TITLE: Activity and persistence of some organophosphorus, carbamate, and pyrethroid insecticides in soil

KEY WORDS: Sex attractant synthesis; Diamondback moth

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. C. C. Leznoff, Dept. of Chemistry, York University

LIAISON OFFICER OR SUPERVISOR: Ontario Pesticides Advisory Committee

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To synthesize isomerically pure cis-9-cis-11 hexadecadienal and cis-9-trans-11-hexadecadienal for testing as the sex attractant of the diamondback moth.

DESCRIPTION:

Two suspected chemical pheromones of the diamondback moth will be synthesized on insoluble polymer supports at York University and transported to Geneva, N. Y. Research Station for biological confirmation.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* Progress report December 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$ 4,150	$ 4,150		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Progress report required annually

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

PC-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* May 23, 1978

PROJECT TITLE: Manganese Sequestration

KEY WORDS: Manganese

PRINCIPLE INVESTIGATOR AND AFFILIATION: F.J. Dart - Water Technology Section

LIAISON OFFICER OR SUPERVISOR: K.J. Roberts

RESEARCH CATEGORY: *INTERNAL* X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To control manganese in water supplies

DESCRIPTION:

Control of manganese by sequestration will be studied and further optimised as various catalytic trace chemical additions are tested.

DURATION OF PROJECT 2 ——— *YEARS* *PRESENT YEAR IS* 2 ——— *YEAR* *REPORTING DATE* Dec, 1978

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$12,000.	$4,000.	0.4	0.2

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

PC-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control Branch *DATE:* May 23, 1978

PROJECT TITLE: Flotation

KEY WORDS:

PRINCIPLE INVESTIGATOR AND AFFILIATION: A. Oda - Water Technology Section

LIAISON OFFICER OR SUPERVISOR: K.J. Roberts

RESEARCH CATEGORY: *INTERNAL* X — *GRANT* — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:

To study the use of the flotation principle as applied to potable water clarification.

DESCRIPTION:

The clarification of water by flotation rather than sedimentation appears to have several advantages; increased rate of throughput with a consequent smaller unit, solids such as algae which are difficult to settle can be removed, the final sludge concentration is greater (about 4-6%) making disposal more economic.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 3 *YEAR* *REPORTING DATE* Dec/78

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$45,000.	-	2	-

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Project held in abeyance - ozone work is predominant

Ministry of the Environment

Ontario

PC-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* May 23, 1978

PROJECT TITLE: Asbestos in Drinking Water Supplies

KEY WORDS: Asbestos, Water

PRINCIPLE INVESTIGATOR AND AFFILIATION: R.B. Hunsinger - Water Technology Section

LIAISON OFFICER OR SUPERVISOR: K.J. Roberts

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —
UNSOLICITED CONTRACT — *SOLICITED CONTRACT* —
MULTI-YEAR PROJECT — *CONCURRENT PROJECT* —

OBJECTIVE:

To survey asbestos levels in raw water and drinking water throughout Ontario.

DESCRIPTION:

Raw and potable water supplies throughout Ontario will be surveyed for asbestos levels. The data will be tabulated with raw water type, water treatment plant process and finished water quality.

DURATION OF PROJECT: on-going *YEARS* *PRESENT YEAR IS* 5 *YEAR* *REPORTING DATE* —

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	-	$10,000.	-	0.5

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Yes, reports are prepared as results are accumulated and need is indicated

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PC-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control DATE: May 23, 1978

PROJECT TITLE:
Ozonation of Potable Water Supplies

KEY WORDS: Ozone

PRINCIPLE INVESTIGATOR AND AFFILIATION: A. Oda - Water Technology Section

LIAISON OFFICER OR SUPERVISOR: K.J. Roberts

RESEARCH CATEGORY: INTERNAL X — GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:
To investigate the use of ozone in potable water treatment.

DESCRIPTION:

Laboratory bench scale and pilot plant studies of ozonation as applied to potable water treatment. Especially investigated will be coloured waters with low turbidity, and the use of ozone as an alternative disinfectant to avoid chlorinated organic by-products. This is essentially an on-going area of study e.g. a report on an investigation at Smiths Falls WTP has been prepared.

DURATION OF PROJECT: on-going YEARS — PRESENT YEAR IS —— YEAR — REPORTING DATE ——

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$18,000	$18,000.		1

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Reports are written for each investigation

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: On-going studies are carried out at various water plants and various raw waters are treated.

MOE 1393 8/78

Ministry of the Environment

Ontario

PC-5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: May 23, 1978

PROJECT TITLE: Chlorinated Organic Formation and Reduction Drinking Water Treatment

KEY WORDS: Chlorination, Organics

PRINCIPLE INVESTIGATOR AND AFFILIATION: C. Fung - Water Technology Section

LIAISON OFFICER OR SUPERVISOR: K.J. Roberts

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:

To study the formation of chlorinated organics following the chlorine treatment step of water treatment and to investigate methods of reduction and removal of such compounds formed.

DESCRIPTION:

Methods to optimise chlorinated organic removal during conventional and modified water treatment methods will be investigated.

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS: 2 YEAR — REPORTING DATE: Aug/1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$70,000.	$5,000.	4	0.25

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

PC-6

RESEARCH AND DEVELOPMENT INVENTORY

Ont. [illegible]

BRANCH: Pollution Control

DATE: May 23, 1978

PROJECT TITLE: Chlorinated Organic Survey of Ontario Drinking Waters.

KEY WORDS: Chlorination, Organics

PRINCIPLE INVESTIGATOR AND AFFILIATION: C. Fung - Water Technology Section

LIAISON OFFICER OR SUPERVISOR: K.J. Roberts

RESEARCH CATEGORY: INTERNAL X — GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:

To survey Ontario's drinking waters for the presence of chlorinated organics following chlorine treatment; to determine compounds present and their concentrations.

DESCRIPTION:

Selected water plants on all Ontario major water sources are sampled according to a specific sampling procedure. Sampling frequency will be determined by the seasonal concentration pattern and concentration levels.

DURATION OF PROJECT: on-going YEARS — PRESENT YEAR IS 4 YEAR — REPORTING DATE -

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	-	$10,000.	-	0.5

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes - as results are available

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Survey is on-going; reports are written as up-dated information becomes available.

MOE 1253 6/78

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT PROJECT

BRANCH: Pollution Control

DATE: May 23, 1978

PROJECT TITLE:

Parasites in Sewage Sludges

KEY WORDS: Parasites, Sludge

PRINCIPLE INVESTIGATOR AND AFFILIATION: H.J. Graham - Water Technology Section

LIAISON OFFICER OR SUPERVISOR: K.J. Roberts

RESEARCH CATEGORY: INTERNAL —— GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT X —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:

To assess the health hazard associated with parasites in sewage sludges used on land.

DESCRIPTION:

Isolation, identification and enumeration of parasites, ova and cysts in digested sewage sludges. In addition to examine the length of time viable ova are found after sludge has been applied to agricultural land.

DURATION OF PROJECT: 3 YEARS

PRESENT YEAR IS: - YEAR

REPORTING DATE: Nov/78

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$59,500.	-	4	0.25

SOURCE OF FUNDS: REGULAR WORK PROGRAM —— SPECIAL MINISTRY FUNDING ——— JOINTLY FUNDED PROJECT COA ——— OTHER ———

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PC-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control Branch

DATE: May 23, 1978

PROJECT TITLE:

Distribution System - Small Animal Survey

KEY WORDS: Distribution, Animals

PRINCIPLE INVESTIGATOR AND AFFILIATION: H.J. Graham - Water Technology Section

LIAISON OFFICER OR SUPERVISOR: K.J. Roberts

RESEARCH CATEGORY:

INTERNAL X — GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:

To study and investigate removal methods, small animals (e.g. snails, nematodes) in distribution systems.

DESCRIPTION:

Sample collection and survey following foam-swab cleaning of distribution mains; isolation, identification and enumeration of animal species.

DURATION OF PROJECT: on-going YEARS — PRESENT YEAR IS - YEAR — REPORTING DATE: Dec/78

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$23,000.	$7,000.	-	0.5

SOURCE OF FUNDS:

REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED?

Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

PC-9

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: May 23, 1978

PROJECT TITLE:

Distribution System Survey

KEY WORDS: Distribution System

PRINCIPLE INVESTIGATOR AND AFFILIATION: A. Vajdic - Water Technology Section

LIAISON OFFICER OR SUPERVISOR: K.J. Roberts

RESEARCH CATEGORY: INTERNAL X — GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:

Examine bacteriological quality in distribution systems and obtain correlation with raw and treated water quality parameters.

DESCRIPTION:

Sampling survey of raw and treated water and water in distribution systems from a number of treatment plants.

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS 3 YEAR — REPORTING DATE: August, 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$65,000.	$6,000.	3	0.6

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

PC-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: May 23, 1978

PROJECT TITLE:
Chloroform Reduction Investigation Program at Belleville Utilities Commission

KEY WORDS: Drinking Water, Chloroform, Public Water Supply

PRINCIPLE INVESTIGATOR AND AFFILIATION: Belleville Utilities Commission, Belleville, Ontario
Gore & Storrie Ltd., Toronto, Ontario.

LIAISON OFFICER OR SUPERVISOR: Cynthia Fung, Water Technology Section

RESEARCH CATEGORY: INTERNAL —— GRANT —— UNSOLICITED CONTRACT X —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:

To demonstrate that laboratory techniques developed by MOE staff will effectively reduce chloroform production during disinfection of drinking water with chlorine.

The results of the study will be applied in the design of the new Belleville treatment plant extension and can be utilized by other municipalities with similar problems both in Ontario and elsewhere.

DESCRIPTION:

The existing plant will be altered so that chlorination will take place after sedimentation in phase 1 and after sedimentation and filtration in phase 2. Production of chloroform and other haloforms will be measured when chlorine is applied following treatment. This can be compared to the normal plant effluent treated in the usual manner.

Ministry staff have developed laboratory methods of reducing chloroform production while using chlorine for the disinfection of water supply. These techniques must now be applied to a full-scale plant. If successful, the technique can be applied to most Ontario plants as this plant is typical of most.

Analytical assistance will be provided to this project by Laboratory Services Branch.

DURATION OF PROJECT: 2 YEARS

PRESENT YEAR IS: second YEAR

REPORTING DATE: March 31, 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
$29,000	$29,000.	$14,000.		

SOURCE OF FUNDS: REGULAR WORK PROGRAM —— SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER —— Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: July 5, 1978

PROJECT TITLE:

UV Disinfection of Secondary Effluent

KEY WORDS: UV, Disinfection, Secondary Effluent, Tertiary Effluent

PRINCIPLE INVESTIGATOR AND AFFILIATION: R.J. Duff, Ontario Ministry of the Environment

LIAISON OFFICER OR SUPERVISOR: F.A. Tonelli, Ontario Ministry of the Environment

RESEARCH CATEGORY: INTERNAL GRANT [×] UNSOLICITED CONTRACT [ ] SOLICITED CONTRACT [ ] MULTI-YEAR PROJECT [ ] CONCURRENT PROJECT [ ]

OBJECTIVE:

To investigate the effectiveness of UV radiation for disinfection of secondary/ tertiary effluent.

DESCRIPTION:

The project involves monitoring the performance of pilot-scale, proprietary, UV disinfection equipment at the Newmarket, Ontario WPCP. The efficiency of the equipment will be evaluated on secondary and tertiary (filtered) effluents. Monitoring will extend over several months and will include two weeks of intensive field work.

DURATION OF PROJECT: 1/2 YEARS PRESENT YEAR IS ——— YEAR REPORTING DATE: December, 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$1,500		1/3	

SOURCE OF FUNDS: REGULAR WORK PROGRAM [×] SPECIAL MINISTRY FUNDING [ ] JOINTLY FUNDED PROJECT [ ] OTHER [ ]

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Support for the project is being given by the Region of York in operations and by Water Refining Inc. who are loaning the UV equipment.

Ministry of the Environment

Ontario

PC-12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: July 5, 1978

PROJECT TITLE: Physical-Chemical Treatment of Stormwater

KEY WORDS: Physical-Chemical Treatment, Stormwater

PRINCIPLE INVESTIGATOR AND AFFILIATION: H. Kronis, Ontario Ministry of the Environment

LIAISON OFFICER OR SUPERVISOR: F. Tonelli, Ontario Ministry of the Environment

RESEARCH CATEGORY: INTERNAL —— GRANT X UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:

To investigate the feasibility and effectiveness of physical-chemical treatment of (separate) stormwater runoff.

DESCRIPTION:

Pilot-scale studies are being carried out at East York site on the physical-chemical treatment of large (500 gallons) composite samples of stormwater. Sequential samples and rainfall data are also gathered to calculate rainfall – runoff relationships and to characterize runoff quality.

DURATION OF PROJECT: 3 YEARS

PRESENT YEAR IS: 3 YEAR

REPORTING DATE: November, 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$27,500	$2,500	4	1

SOURCE OF FUNDS: REGULAR WORK PROGRAM X SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED?

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Previously funded by Canada/Ontario Agreement.

MOE 1233 6/78

Ministry of the Environment
Ontario

PC-13

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* May 31, 1978

PROJECT TITLE:
Nitrification and Denitrification of Sewage Treatment Plant Effluents

KEY WORDS: Nitrification, secondary effluent, rotating biological contactor, fixed bed reactor

PRINCIPLE INVESTIGATOR AND AFFILIATION T. Hewitt, A.K. Ho

LIAISON OFFICER OR SUPERVISOR R. Khettry

RESEARCH CATEGORY:
INTERNAL × *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
To evaluate unit processes suitable for providing high degrees nitrification of secondary effluents.

DESCRIPTION:
Pilot equipment has been installed at an operating sewage treatment plant to determine operational parameters and efficiencies of the fixed bed reactors for nitrifying a secondary effluent and that of the RBC for denitrifying the effluent from the towers.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* June, 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$7,500	$1,000	2.0	1.0

SOURCE OF FUNDS:
REGULAR WORK PROGRAM × *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PC-14

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: May 31, 1978

PROJECT TITLE: Aerated Lagoon Evaluation

KEY WORDS: Aerated lagoon, design, operation

PRINCIPLE INVESTIGATOR AND AFFILIATION W. Lewandowski, Ministry of the Environment

LIAISON OFFICER OR SUPERVISOR S.A. Black

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To conduct a detailed evaluation of existing aerated lagoons in Ontario to optimize design and operational criteria.

DESCRIPTION:

This project involves one-week summer and winter evaluations of 5 aerated lagoon system installations in the Province. Factors such as: treatment efficiency, aeration capacity, mixing capabilities, etc. will be determined and evaluated.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* September, 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$2,500		0.4	

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PC-15

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: May 31, 1978

PROJECT TITLE: Mixing in Anaerobic Digesters

KEY WORDS: Mixing, Digesters

PRINCIPLE INVESTIGATOR AND AFFILIATION J. Smart, Ministry of the Environment

LIAISON OFFICER OR SUPERVISOR R.K. Khettry

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —
UNSOLICITED CONTRACT — *SOLICITED CONTRACT* —
MULTI-YEAR PROJECT —
CONCURRENT PROJECT —

OBJECTIVE:

A study of the relative efficiencies of the various mixing devices used in anaerobic digesters in Ontario.

DESCRIPTION:

About 10 anaerobic digesters were dosed with the tracer sodium fluoride. Sludge samples were taken to determine (a) how quickly the fluoride is dispersed in the digester, and (b) how long does the primary digester effluent need for a "wash-out" of the fluoride.

DURATION OF PROJECT 2 *YEARS*
PRESENT YEAR IS 2 *YEAR*
REPORTING DATE June, 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$3,000		0.2	

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING —
JOINTLY FUNDED PROJECT —
OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PC-16

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: May 31, 1978

PROJECT TITLE:
Biological Nitrification, Process Evaluation

KEY WORDS: Biological nitrification, single sludge, full-scale

PRINCIPLE INVESTIGATOR AND AFFILIATION A. Smith, Ministry of the Environment

LIAISON OFFICER OR SUPERVISOR S.A. Black

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To determine the operational parameters and the treatment capabilities of the biological nitrification-denitrification process.

DESCRIPTION:

Laboratory, pilot-scale and full-scale evaluations have been conducted on the single-sludge process in order to optimize design criteria such as: detention times for aeration and denitrification, mixed liquor suspended solids, sludge age, sludge return rates, methanol dosages, etc. The program is being extended into a 6th year for a study of automatic controls on the nitrification process.

DURATION OF PROJECT 7 *YEARS* *PRESENT YEAR IS* 7 *YEAR* *REPORTING DATE* December, 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$40,000		0.2	

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT X
OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PC-17

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:*

PROJECT TITLE:

Large Scale Tile Field

KEY WORDS: Sewage Effluent, Soil Disposal

PRINCIPLE INVESTIGATOR AND AFFILIATION H.T. Chan, Applied Sciences Section, Pollution Control Branch

LIAISON OFFICER OR SUPERVISOR M.B. Fielding, Applied Sciences Section, Pollution Control Branch

RESEARCH CATEGORY: *INTERNAL* X *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To determine the effects of discharging large volumes of sewage effluent (>10,000 gpd) in sub-surface soil systems.

DESCRIPTION:

Effluent from an extended aeration STP is discharged by a dosing system, to a 1.25 acre tile field. Chemical and hydraulic parameters are monitored by means of a well point net.

DURATION OF PROJECT 4 *YEARS* *PRESENT YEAR IS* 3 *YEAR* *REPORTING DATE* ——

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$85,000	$5,000	5	1.5

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PC-18

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:*

PROJECT TITLE:

Water Main Insulation

KEY WORDS: Buried water mains, Insulation

PRINCIPLE INVESTIGATOR AND AFFILIATION: A. Cohen, Applied Sciences Section, Pollution Control Branch

LIAISON OFFICER OR SUPERVISOR: M.B. Fielding, Applied Sciences Section, Pollution Control Branch

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To determine the effectiveness of insulation for buried water mains.

DESCRIPTION:

Monitoring soil temperature over and around a buried water main.

DURATION OF PROJECT: 4 YEARS *PRESENT YEAR IS:* 3 YEAR *REPORTING DATE:* ——

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$55,000	$5,000	2	0.6

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Report on completion.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

PC-19

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:*

PROJECT TITLE:

Sand Filtration of Septic Tank Effluent

KEY WORDS: Filtration, Effluent Treatment, Septic Tank, Purification

PRINCIPLE INVESTIGATOR AND AFFILIATION N.A. Chowdhry, Applied Sciences Section
Pollution Control Branch

LIAISON OFFICER OR SUPERVISOR M.B. Fielding, Applied Sciences Section
Pollution Control Branch

RESEARCH CATEGORY:
INTERNAL X *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To provide an alternative disposal system to a conventional tile field bed.

DESCRIPTION:

The operation and monitoring of sand filters on a septic tank effluent.

DURATION OF PROJECT 5 *YEARS* *PRESENT YEAR IS* 5 *YEAR* *REPORTING DATE* ——

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$48,000	$5,000	2.5	0.5

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Report on completion

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

PL--1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WATER RESOURCES *DATE:* December 1977

PROJECT TITLE: Bio-accumulation rates, Acute and Chronic Effects of Five New Dielectric Fluids on American Flagfish

KEY WORDS: Dielectric Fluids, American Flagfish, Carcinogens, Bio-accumulation, PCB's, Ontario Hydro, Dow Chemical, Fish Reaction

PRINCIPLE INVESTIGATOR AND AFFILIATION: G. W. Ozburn, Lakehead University, Thunder Bay, Ontario

LIAISON OFFICER OR SUPERVISOR: G. R. Craig

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* —— *UNSOLICITED CONTRACT* X *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X *CONCURRENT PROJECT* ——

OBJECTIVE:

1. To determine bio-accumulation rates of P.C.B. substitutes in brook trout;
2. To compare the acute (lethal) levels of these products using flagfish;
3. To evalue the chronic effects of the same products on the life cycle of Jorganella.

DESCRIPTION:

Five substitution products for P.C.B.'s selected in conjunction with Ontario Hydro will be tested to determine their health effects and environmental properties.

The results should show whether the products are bio-accumulative and their acute and chronic toxicity.

These results will be utilized along with other data being accumulated by Ontario Hydro to determine the acceptability of these potential P.C.B. substitutes.

To fund substitutes for P.C.B.'s that do not have the adverse health and associated environmental hazards and retain the benefits of P.C.B. commercial use.

DURATION OF PROJECT: 3 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE:* March 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$222,100	$67,000		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* X Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No. Test samples supplied by Ontario Hydro and others

REMARKS: Provincial Lottery - Project 77-003-32

Ministry of the Environment
Ontario

PL-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES *DATE:* April 1977

PROJECT TITLE: Detection, Enumeration and Interpretation of Levels of Virus in Drinking Water & Bathing Waters.

KEY WORDS: Virus, Drinking Water, Bathing Water, Water Quality, Ottawa River, Swimming, Beaches, Brittania Beach

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. Syed A. Sattar, Faculty of Medicine, University of Ottawa, Ottawa, Ontario

LIAISON OFFICER OR SUPERVISOR L. T. Vlassoff

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* X
MULTI-YEAR PROJECT X *CONCURRENT PROJECT* ——

OBJECTIVE:

To provide guidelines to interpret the significance of levels and types of virus in bathing and drinking waters;

To determine levels of virus in the Ottawa River;

To identify types of virus isolated above using developed techniques.

DESCRIPTION:

Collect samples of sewage plant effluents, Brittania Beach water and Brittania Water Treatment Plant water. Use specialized sensitive techniques to determine numbers and types of virus.

Prepare guidelines for the interpretation of specific levels of virus particularly for swimming water.

This project will provide a basis for Ministry development of guidelines and an insight into water quality re virus in an area where virus have been frequently reported. The special concentration techniques required for virus isolation must be verified.

DURATION OF PROJECT 2 1/2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* September 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$92,700	$53,600		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER X Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Provincial Lottery - Project 77-004-11

Ministry of the Environment
Ontario

PL-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 1977

PROJECT TITLE: An Investigation of the Environmental Health Hazards Associated with Road Oiling

KEY WORDS: Road Oil, Oiling of Highways, Contamination from Highways

PRINCIPLE INVESTIGATOR AND AFFILIATION: Frank Guillaume
L. S. Love & Associates, Brampton, Ontario

LIAISON OFFICER OR SUPERVISOR: F. R. Phoenix

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* X *MULTI-YEAR PROJECT* X *CONCURRENT PROJECT* ——

OBJECTIVE:

To determine the nature and origin of materials utilized as "road oil";
To determine what contaminants are present in "road oil";
To observe the application of the material and the migration of the contaminants into the environment;
To determine the effects on soils, crops, vegetation and aquatic life;
To evaluate the potential hazard to human health and the environment.

DESCRIPTION:

To study the nature of the contaminants in the material applied, the movement of these into the environment and the mechanisms involved. Runoff will be monitored and samples of soil and roadbed will be analyzed. Vegetation and crops will be examined to determine surface contamination as well as the uptake of metal, etc. Air samplers will be employed to estimate the quantity of dust transported from the roads. Four sites will be considered to provide as many physical variables as possible. Because of climatic variations and the anticipated rate of movement of contaminants, the study is carried on for two full years.

Sound information will be collected to determine whether the practice whereby all manner of liquid industrial wastes together with used oils are disposed of on rural roads can be eliminated.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* March 31, 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$138,600	$61,100		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* X *OTHER* Provincial Lottery

IS A REPORT ANTICIPATED? Yes. Documenting the hazards and suggesting alternatives and acceptable methods of disposal for used oils.

PARTICIPATION BY OTHER MINISTRIES: Ministry of Transportation and Communications

REMARKS:

Provincial Lottery - Project 77-005-11

Ministry of the Environment

Ontario

PL-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* November 1977

PROJECT TITLE: Chloroform Reduction Investigation Program at Belleville Utilities Commission

KEY WORDS: Disinfection, Drinking Water, Chloroform, Public Water Supply, Belleville Water

PRINCIPLE INVESTIGATOR AND AFFILIATION Belleville Utilities Commission, Belleville, Ontario
Gore & Storrie Ltd., Toronto, Ontario

LIAISON OFFICER OR SUPERVISOR Cynthia Fung, Water Technology Section

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT X *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT X *CONCURRENT PROJECT* ——

OBJECTIVE:

To demonstrate that laboratory techniques developed by MOE staff will effectively reduce chloroform production during disinfection of drinking water with chlorine.

The results of the study will be applied in the design of the new Belleville Treatment Plant extension and can be utilized by other municipalities with similar problems both in Ontario and elsewhere.

DESCRIPTION:

The existing plant will be altered so that chlorination will take place after sedimentation in phase 1 and after sedimentation and filtration in phase 2. Production of chloroform and other haloforms will be measured when chlorine is applied following treatment. This can be compared to the normal plant effluent treated in the usual manner.

Ministry staff have developed laboratory methods of reducing chloroform production while using chlorine for the disinfection of water supply. These techniques must now be verified in a full-scale plant. If successful, the technique can be applied to most Ontario plants.

Analytical assistance was provided to this project by Laboratory Services Branch for year No. 1 only.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* March 31, 1979

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$82,500	$69,000		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER X Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Provincial Lottery - Project 77-008-32

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: NORTHEASTERN REGION *DATE:* August 1978

PROJECT TITLE: PCB Clean-up and Assessment Near Dowling, Ontario.

KEY WORDS: PCB's, Dowling, CPR Accident, Railway Accident, Soil Contamination

PRINCIPLE INVESTIGATOR AND AFFILIATION Geocon (1975) Ltd.

LIAISON OFFICER OR SUPERVISOR L. W. Fitz

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* X *MULTI-YEAR PROJECT* X *CONCURRENT PROJECT* ——

OBJECTIVE:

1. Engineering evaluation/assessment of PCB-soil interaction, potential effect on groundwater and potential health hazard.
2. As part of (1) above, conduct laboratory studies to develop preliminary information on PCB-soil adsorption/desorption characteristics.
3. Implement remedial works as required based on (1) and (2) above.

DESCRIPTION:

A CP train accident near Dowling, Ontario resulted in the largest individual spill of PCB to the environment in Ontario. As a result of an Environmental Appeal Board decision on an appeal by CP Rail, the Ministry was ordered to evaluate and implement remedial measures at the derailment site.

Development of information on PCB-soil-water interaction which will have widespread use in further contingencies to minimize potential health hazard and in assisting regulatory authorities in developing environmental guidelines.

Removal of dangerous contaminant and minimization of potential effect on the ground water system which is a source of municipal water supply.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	* $289,600	$80,000		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* X *OTHER* X Provincial Lottery

IS A REPORT ANTICIPATED? Yes. Geocon (1975) Ltd.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Provincial Lottery - Project 77-009-11
Year 1 shared 50/50 with Canadian Pacific Railway.
* The "Research" portion of this total funding is $40,000, e.g. $20,000 in FY 78/79 and $20,000 in FY 79/80.

Ministry of the Environment

Ontario

PL-6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* October 1977

PROJECT TITLE: Chemical Identification and Biological Assay of Airborne and Waterborne Mutagens (Carcinogens)

KEY WORDS: Mutagens, Carcinogens, Biological Assay, Airborne Mutagens, Waterborne Mutagens

PRINCIPLE INVESTIGATOR AND AFFILIATION York University (M. Katz and J. Heddle)

LIAISON OFFICER OR SUPERVISOR R. B. Caton

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT X *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT X *CONCURRENT PROJECT* ——

OBJECTIVE:

To utilize newly developed, rapid, accurate and economical bioassay techniques to determine the mutagenic activity and carcinogenic potential of polynuclear aromatic hydrocarbons (PAH) and related epoxides, quinones and other oxidation or photo-oxidation products. To separate and identify by analysis the PAH and other potentially carcinogenic organic compounds derived from the particulate matter of the polluted urban environment, from coke oven effluents and from other energy-related sources in air pollution and water pollution samples. To determine which chemicals or combinations of chemicals are responsible for mutagenic activity.

DESCRIPTION:

Chemical separation, identificaiton and analysis of PAH and other organic compounds in samples obtained from polluted air and water will be made by techniques of high speed liquid, gas and thin-layer chromatography; ultraviolet fluorescence and mass spectrometry, using methods developed by Katz and his co-workers. The mutagenic activity of these compounds will be tested singly and in pairwise and multiple combinations by three "in vivo" systems, consisting of one bacterial and two mammalian assays, using mice. The bacterial assay will employ histidine auxotrophs of Salmonella. One mammalian system will be the micronucleus assay of Heddle, using cells of bone marrow or liver and the other will involve the abnormal sperm head assay of Bruce.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* March 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$370,000	$73,700		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER —— Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Provincial Lottery - Project 78-010-33

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* February 1978

PROJECT TITLE: Province-Wide Quantity/Location Inventories and Emission/Discharge Inventories for Specified Chlorinated and Aromatic Hydrocarbons.

KEY WORDS: Aromatic Hydrocarbons, Chlorinated Hydrocarbons, Inventory, Discharge Inventories

PRINCIPLE INVESTIGATOR AND AFFILIATION Acres Consulting Services Ltd., Toronto, Ontario

LIAISON OFFICER OR SUPERVISOR B. A. Holden

RESEARCH CATEGORY:

INTERNAL ——	*UNSOLICITED CONTRACT* ——	*MULTI-YEAR PROJECT* X
GRANT ——	*SOLICITED CONTRACT* X	*CONCURRENT PROJECT* ——

OBJECTIVE:

The overall objective of this study is to assess community exposure to hazardous substances which belong to the chlorinated and aromatic hydrocarbon classes of chemicals.

These substances have the potential for causing significant environmental health impact if released and have been designated by the Hazardous Substances Committee as high priority, requiring immediate attention. In lieu of costly and time consuming source measurements, estimated discharges/emissions will be prepared for a limited number of hydrocarbons.

DESCRIPTION:

Two comprehensive and sequential reports are to be prepared, under contract, for selected chlorinated and aromatic hydrocarbon compounds. The first will consist of province-wide quantity/location inventories for a specified group of hazardous substances. The second will consist of emission/discharge inventories for selected substances designated as high priority following the completion of the first report.

Both the first and second phase results will individually be reported in written format and in a computerized data base form. At the initiation of the contract, the chemicals to be specified will be reviewed to avoid duplication and to ensure their high priority status.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* March 1980

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$195,600	$142,800		

SOURCE OF FUNDS:

REGULAR WORK PROGRAM ——	*SPECIAL MINISTRY FUNDING* ——	*JOINTLY FUNDED PROJECT* ——	*OTHER* —— Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Provincial Lottery - Project 78-011-12

Ministry of the Environment

Ontario

PL-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* November 1978

PROJECT TITLE: Disposal of Sewage Sludge on Agricultural Land

KEY WORDS: Sewage Sludge, Sludge, Agricultural Land, Disposal of Sludge, Metals, Heavy Metals

PRINCIPLE INVESTIGATOR AND AFFILIATION University of Guelph (T. E. Bates)

LIAISON OFFICER OR SUPERVISOR S. A. Black

RESEARCH CATEGORY:

INTERNAL —— *GRANT* ——

UNSOLICITED CONTRACT X *SOLICITED CONTRACT* ——

MULTI-YEAR PROJECT X *CONCURRENT PROJECT* ——

OBJECTIVE:

To determine the long-term effects of sewage sludge application to agricultural land on the yield and quality of the crops produced with particular emphasis on heavy metal content.

DESCRIPTION:

Sludges resulting from chemical treatment of sewage for phosphorus removal are applied to soils in the field and greenhouse to determine the effect on yield, quality and metal content of crops. Crop yields are measured and plant material analysed for nutrients and metals. Soils will also be analysed for nutrients and metals.

These trials will provide information on the effect of sludge on crop yield and quality including metal content. In general we expect crop yields to be at least as good as with manufactured fertilizers. Additions of most metals are expected to cause concern regarding the quality of crops for human or animal food at rates that do not adversely affect crop yield.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* March 1981

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$238,000	$110,300		

SOURCE OF FUNDS:

REGULAR WORK PROGRAM ——

SPECIAL MINISTRY FUNDING ——

JOINTLY FUNDED PROJECT ——

OTHER —— Provincial Lottery

IS A REPORT ANTICIPATED? Yes. Reports issued yearly on this Project since 1972/73.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Provincial Lottery - Project 78-012-33
Project was previously funded by the Canada Ontario Agreement on Great Lakes Water Quality who have published Reports Nos. 16, 24, 35, 60 and 73, (Volumes 1 - V).

Ministry of the Environment

Ontario

PL-9

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* April 1978

PROJECT TITLE: Effects of Applying Digested Sewage Sludges to Agricultural Land - Lysimeter Studies.

KEY WORDS: Sewage Sludge, Sludge, Agricultural Land, Disposal of Sludge, Metals, Heavy Metals, Lysimeters

PRINCIPLE INVESTIGATOR AND AFFILIATION Rush Engineering Services Ltd,

LIAISON OFFICER OR SUPERVISOR M. W. Weber, (S.A. Black for M.O.E.)

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* —— *UNSOLICITED CONTRACT* X *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X *CONCURRENT PROJECT* ——

OBJECTIVE: The overall objective of this study is to define the long-term maximum allowable sludge application rates to various agricultural soils growing either forage or edible crops without causing deleterious effects to plant quality, ground water quality, and soil productivity.

A secondary objective is to compare Wastewater Technology Centre (WTC) lysimeter data to University of Guelph field data.

DESCRIPTION: Current Environment Canada projects 034 and 035 will be revised and identified as 034A, 034B, 034C, 034D and 034E for all future reference sample identification.

034A - 22 lysimeters with silt loam/fluid sludge/orchard grass.
034B - 22 lysimeters with loamy sand/chemical fertilizer/orchard grass.
034C - 22 lysimeters with high risk soil/sludge/orchard grass.
034D - 44 lysimeters with sand and clay/airdried sludge/wheat.
034E - 44 lysimeters with high risk soil/airdried sludge/swiss chard.

U of G field data will be stored on computer at CCIW for comparison to WTC lysimeter data.

Information so developed can then be incorporated into guidelines or standards which determine with reasonable factors of safety a permissible code of practice. The standards must state clearly the maximum permissible concentrations of toxic or undesirable contaminants in sludge, soil, plants, runoff, and leachate to ground water.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* March 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$105,100	$35,100		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* X *OTHER* —— Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: Environment Canada, Wastewater Technology Centre, Burlington

REMARKS:

Provincial Lottery - Project 78-013-33
Project was previously funded by the Canada/Ontario Agreement on Great Lakes Water Quality - Reference is COA Report Nos. 67 and 79.

Ministry of the Environment

Ontario

PL-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* March 1978

PROJECT TITLE: A Study of Atmospheric Mercury Deposition in Ontario

KEY WORDS: Mercury, Atmosphere, Deposition, Transport, Conversion, Field Survey, Instrument Development, Fallout of Mercury

PRINCIPLE INVESTIGATOR AND AFFILIATION Ontario Research Foundation

LIAISON OFFICER OR SUPERVISOR S. Gewurtz

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* X
MULTI-YEAR PROJECT X *CONCURRENT PROJECT* ——

OBJECTIVE: Long-range atmospheric transport may make an important contribution to surface deposition of mercury in areas remote from known point sources. The primary objective of this study will be to collect experimental data on atmospheric levels and deposition rates of mercury at specific locations in Ontario. These results will be used to estimate the total deposition flux of mercury to land and water surfaces in urban and rural areas of Ontario, and thus define the relative importance of the atmosphere as a medium for the transport of mercury.

DESCRIPTION: The study will be initiated with a literature review, with emphasis on atmospheric transport and conversion processes, and sampling and analytical methodology. A mobile field monitoring station will be assembled and operated for 6 months in the Toronto and Huntsville areas. Airborne concentrations and deposition rates of mercury, and relevant meteorological parameters required for interpretation of the results will be measured at these sites. Elemental, organic and particulate mercury components will be identified. In subsequent optional phases of the study, a one-year survey involving four sampling sites and an indepth evaluation of the data may be undertaken.

The proposed programme should provide adequate experimental data to accurately define the total deposition flux of mercury to land and water surfaces in Ontario at the specified sampling sites. The relative importance of various forms of mercury, and the specific scavenging mechanisms which remove mercury from the atmosphere, should also be defined. An effort will be made to define the atmospheric conditions most often associated with high rates of mercury deposition.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* 1980

BUDGET:

	TOTAL DOLLARS	MAN YEARS
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$298,700	$106,000		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER X Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Provincial Lottery - Project 78-014-13

Ministry of the Environment
Ontario

PL-11

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* May 1978

PROJECT TITLE: An Investigation of the Health and Welfare Effects on Noise in Ontario

KEY WORDS: Noise, Effects of Noise, Health Effect of Noise, Audiological Testing

PRINCIPLE INVESTIGATOR AND AFFILIATION SNC/GECO Canada, Inc., 100 Adelaide St. W., Toronto, Ontario

LIAISON OFFICER OR SUPERVISOR J. Manuel

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT X *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT X *CONCURRENT PROJECT* ——

OBJECTIVE:

To supply data on the health and welfare effects of different noise sources in Ontario and to determine a noise descriptor which adequately describes them.

A comprehensive data base of the health and welfare effects of noise from different noise sources in Ontario.

A description of how these effects vary with noise level.
A noise descriptor which adequately describes these effects.

DESCRIPTION:

Selection of 25 sites near railway, highways, industry, and airports in Ontario.

Social survey, audiological test and health records examination.

Statistical data analysis.

Selection of optimum noise descriptor.

The data base revealed by this study will provide comprehensive information on the health and welfare effects of noise in Ontario.

This information will be of great use in developing Ontario government policies and guidelines on noise.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$65,000	$50,000		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER X Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Provincial Lottery - Project 78-015-31

Ministry of the Environment

Ontario

PL-12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: CENTRAL REGION *DATE:* July 1978

PROJECT TITLE: Sanitary Landfill Site Investigation at Canadian Forces Base, Camp Borden

KEY WORDS: Camp Borden, Canadian Forces Base, Garbage Dump, Sanitary Landfill Site, Landfill Site, Leachate

PRINCIPLE INVESTIGATOR AND AFFILIATION University of Waterloo

LIAISON OFFICER OR SUPERVISOR N. L. Embree

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* —— *UNSOLICITED CONTRACT* X *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X *CONCURRENT PROJECT* ——

OBJECTIVE:

Investigations of the C.F.B. Camp Borden Landfill Site to study;

1. physical hydrogeology;
2. contaminant geochemistry;
3. anaerobic decomposition and sorption of leachate organics in soil;
4. leachate production patterns, and
5. mathematical modelling of contaminant flux.

DESCRIPTION:

The objectives are being pursued by means of field studies at Camp Borden laboratory studies that involve materials from the Borden site, and computer studies using mathematical models with Borden data as the input. The Borden site was chosen because its 40 year age, soil types, groundwater flow patterns, and geology, all of which are most favourable to intensive scientific study.

ANTICIPATED RESULTS:

1. develop and evaluate improved methods for monitoring leachate contamination;
2. compare and evaluate methods for prediction of groundwater velocity;
3. better understanding of the behaviour of inorganic contaminants;
4. better understanding of rates and processes of anaerobic decomposition of leachate, and
5. evaluation of suitability of digital simulation models for analysis of the patterns of contaminant migration.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* 1979

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$36,300	$21,200		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* X *OTHER* —— Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Provincial Lottery - Project 78-016-32

This project is funded 50/50 with Environment Canada who supported it 100% prior to FY 1978/79.

Ministry of the Environment

Ontario

PL-13

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* August 1978

PROJECT TITLE: A Study on the Relationship between Hospital Admission Rates for Acute Respiratory Illness and the Air Quality in Several Ontario Cities

KEY WORDS: Respiratory Illness, Hospital Entrances, Air Quality

PRINCIPLE INVESTIGATOR AND AFFILIATION University of Toronto. Dr. G. J. Stopps

LIAISON OFFICER OR SUPERVISOR M. Fitch, Ministry of Labour

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* —— *UNSOLICITED CONTRACT* X *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To establish whether Acute Respiratory Disease varies with Air Quality

The Hospital Admissions for Acute Respiratory Diseases in cities with high air pollution level may correlate with the level of Sulfur Dioxide and Particulate Matter, but no such correlations will be expected from cities with low air pollution level.

DESCRIPTION:

Six Ontario Cities (Hamilton, London, Ottawa, Toronto, Sudbury and Windsor), four Air Pollutants (Carbon Monoxide, Ozone, Particulate Matter and Sulfur Dioxide) and the Hospital Admission Rate for five Acute Respiratory Diseases will be studied. For each city under study, the number of Hospital Admissions for the five Acute Respiratory Disease Categories will be collected everyday for the year 1976. These figures will be related to the air condition of that day and the previous two days because the damaging effects of a particular Air Pollutant might not be immediate.

If the desirable ambient air quality could be determined from the result of the study then the number of cases of Acute Respiratory Illness may be reduced to a minimum, by proper control of the air pollution level in cities with relatively bad air quality.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$1,200	$1,200		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* X *OTHER* X Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: Air Pollution Data supplies by others in Federal and Provincial Governments.

REMARKS:

Provincial Lottery Project 78-017-31
This project pays for the Hospital Admission Computer Data required from 1976 records.

Ministry of the Environment

Ontario

PL-14

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* August 1978

PROJECT TITLE: Development of an Experimental Marsh Treatment Facility at Listowel, Ontario

KEY WORDS: Marsh, Experimental Marsh, Listowel, Tertiary Treatment

PRINCIPLE INVESTIGATOR AND AFFILIATION Gore & Storrie Ltd., 1670 Bayview Avenue, Toronto, Ontario

LIAISON OFFICER OR SUPERVISOR S. A. Black

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* X
MULTI-YEAR PROJECT X *CONCURRENT PROJECT* ——

OBJECTIVE:

See next page.

DESCRIPTION:

See next page.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* 1982

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$200,000	$20,000		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT X
OTHER —— Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

MOE Southwestern Region, Branches and Listowel

REMARKS:

Provincial Lottery - Project 78-018-13

PROJECT TITLE: Listowel Artificial Marsh Project	IN-HOUSE	
	EXTERNAL	x

"M.B.R." DATA

(1) OBJECTIVE/S: (1) To establish a pilot artificial marsh treatment system incorporating different modes of operation to permit determining effectiveness of system in reducing bacteriological contamination, heavy metals and nutrients contained in lagoon effluents discharged to receiving streams.
(2) To permit the determination of the optimum design for an artificial marsh system, considering both effluent quality and cost factors including the possible need for plant harvesting measures.
(3) To assess the cost of establishing marsh type systems, in relation to presently accepted modes of treatment, to accept wastes with varying strengths during the various seasons of the year.

(2) DESCRIPTION: The project will consist of the design and construction of a pilot artificial marsh treatment system. The system will occupy 5 acres and provide for several modes of operation. These include emergent vegetation ponds (up to 12 inches of liquid) and submergent vegetation ponds (up to 3' in depth). In addition a canal-like pond will be constructed to permit harvesting of plants. The system will be capable of receiving lagoon effluent or effluent from an aerated cell. It will be located on property owned by the Ministry of the Environment immediately adjacent to the Listowel sewage treatment facilities also owned and operated by the Ministry.

(3) ANTICIPATED RESULTS: Natural marshes have been used successfully in the treatment of wastes. It is anticipated that artificial marshes will also be effective in reducing bacterial counts and other contaminants but information on design, construction costs and types of systems which may be effective in Ontario's climate is lacking. The Listowel site offers an excellent opportunity to evaluate, through a pilot system, the various combinations of systems, the practicality of providing artificial marshes to reduce pollutants in the lagoon discharge to surface waters.

(4) OUTLINE OF BENEFITS: The establishment of criteria for a successful marsh system would afford a means for effectively reducing bacterial, heavy metal, nutrient and other contaminant loads on surface waters.

Ministry of the Environment
Ontario

PL-15

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: NORTHEASTERN REGION *DATE:* August 1978

PROJECT TITLE: Environmental Assessment Study on Uranium and Other Elements in Plants around Ontario Uranium Mines

KEY WORDS: Environmental Assessment, Uranium Contamination

PRINCIPLE INVESTIGATOR AND AFFILIATION Elliot Lake
Laurentian University, Sudbury, Ontario

LIAISON OFFICER OR SUPERVISOR

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT X *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT X *CONCURRENT PROJECT* ——

OBJECTIVE:

1. To collect lichen, moss and selected water samples in the vicinity of the Elliot Lake mining operations.
2. To develop the appropriate analytical procedures for the evaluation of the levels of uranium and related elements in the collected samples.

DESCRIPTION:

Plant and selected water samples will be collected during the late summer and autumn of 1978 along appropriate transects from accessible emission sources. The methods employed to analyse the samples will include atomic absorption spectrophotometry, X-ray fluorescence spectrometry and pulse polarographic procedures. Initially, multi-element X-ray fluorescence spectra will be used to identify and select elements for subsequent routine analyses.

This project will provide baseline data, not currently available, on the levels of uranium and related elements in lichens and mosses. The results will indicate whether the observed levels correlate with uranium mining operations.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* 1979

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$20,000	$14,900		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER —— Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Provincial Lottery - Project 78-019-32

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* October 1978

PROJECT TITLE: Epidemiological Study to Determine the Health Effects of Particulates and SO_2 Level (and other gases) in air

KEY WORDS: Childrens' Health, Air Pollution Health Effects, Particulates, SO_2 Epidemiological Study, Socioeconomic Factors

PRINCIPLE INVESTIGATOR AND AFFILIATION McMaster University, Hamilton, Ontario

LIAISON OFFICER OR SUPERVISOR I. G. Simmonds

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X *CONCURRENT PROJECT* ——

OBJECTIVE:

The purpose of this project is to determine the interrelation of the several factors in a child's environment which may affect his respiratory health, in terms of both respiratory symptoms and pulmonary function.

DESCRIPTION:

An important aspect of the project concerns accurate measurements of suspended particulates (with regard to concentration, size and chemical composition) and sulphur dioxide at multiple sites, both indoors and outdoors. In addition, certain aspects of the home environment (i.e. parental smoking, type of cooking system, etc.) will be surveyed and integrated with socioeconomic factors which may also affect the prevalence of respiratory illness, such as the quality of the housing, the size and age of the family and the density of dwelling. The respiratory condition of approximately 3,800 school children will be determined by extensive pulmonary function testing.

Measurements of air pollution will produce accurate characterization of the quality of the air which the child breathes. A thorough account of socioeconomic characteristics and respiratory condition will be obtained. It is anticipated that these results will be sufficient both in quantity and quality to enable us to define the lower ends of the dose-response curves for the effect of suspended particulates and sulphur dioxide on respiratory symptoms.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$380,900	$292,771		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* X *OTHER* —— Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Provincial Lottery - Project 78-020-33
Funded 50/50 by Health & Welfare Canada and Ministry of the Environment

Ministry of the Environment
Ontario

PL-17

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* September 1978

PROJECT TITLE: Organic Contaminant Removal from City of Brantford Drinking Water

KEY WORDS: Drinking Water, Organics Removal, Activated Carbon, Trihalomethanes, Post-chlorination, Pre-chlorination, Filtration

PRINCIPLE INVESTIGATOR AND AFFILIATION Atlas Chemicals Industries, Canada Ltd.
J. F. MacLaren Ltd. Enviroclean Ltd.

LIAISON OFFICER OR SUPERVISOR R. B. Hunsinger

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT X *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

OBJECTIVE: To determine the effect of activated carbon on the concentration of organic compounds (with primary emphasis on trihalomethanes) in the finished water at the Brantford Water Plant.

Assessment of the effectiveness of activated carbon as a means of reduction of trihalomethane and other organic contaminants in treated drinking water applicable not only to Brantford but to other systems of similar conventional treatment.

DESCRIPTION:

Pilot scale treatment facilities will be operated in such a way as to simulate current operation of the Brantford Water Plant, initially substituting post-chlorination for pre-chlorination and secondly, using the post-chlorination mode, to substitute granular activated carbon and sand filtration for conventional sand or multimedia filtration. After sufficient data has been collected to characterize the two processes above, other unit processes may be altered to further optimize organic removal. Organics in drinking water has been a highly visible subject in the media and the implementation of set standards being imposed by health authorities is imminent. This project will demonstrate the feasibility of activated carbon and post-chlorination as a readily adaptable in-plant modification for the purpose of organic removal which would be applicable to many water filtration systems in Ontario and beyond.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* 1979

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$48,000	$37,000		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER —— Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Provincial Lottery Project 78-021-31

Ministry of the Environment

Ontario

PL-18

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WATER RESOURCES *DATE:* November 1978

PROJECT TITLE: Effects of pH on Mercury Accumulation by Fish

KEY WORDS: Mercury, pH, Fish, Acid Rain, Mercury Accumulation, Bioconcentration, Algae, Plankton

PRINCIPLE INVESTIGATOR AND AFFILIATION James F. MacLaren Ltd., Willowdale, Ontario

LIAISON OFFICER OR SUPERVISOR G. R. Craig

RESEARCH CATEGORY:

INTERNAL —— *GRANT* ——

UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* X

MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To evaluate the accumulation of mercury through an aquatic food chain under low pH lake conditions. The influence of pH over Hg accumulation in aquatic biota will be identified and quantified or other parameters of water chemistry which also may affect accumulation will be identified.

DESCRIPTION:

Lake water, fish, plankton will be collected and exposed to Hg in the lake column simulators at the CCIW laboratory in Burlington. Chemical analysis will be completed on all samples, interpretation and documentation of results will be complete within one year.

Laboratory data collected in the absence of other environmental variables will establish the pH-Hg accumulation inter dependency. Strong pH-Hg correlations will emphasize the significance of metals containing acid rains and provide strong basis for greater control over atmospheric emissions high in SO_4, NO_2, NO_x and metals. Algae, zooplankton and fish will be exposed to low concentrations of radioactive Hg in water collected from low pH, low alkalinity lakes in Southern Ontario. Mercury in all trophic levels will be monitored to determine the rate and extent of transfer.

DURATION OF PROJECT 1 —— *YEARS* *PRESENT YEAR IS* 1st —— *YEAR* *REPORTING DATE* 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$41,900	$41,900		

SOURCE OF FUNDS:

REGULAR WORK PROGRAM ——

SPECIAL MINISTRY FUNDING ——

JOINTLY FUNDED PROJECT X

OTHER —— Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: Environment Canada, CCIW, Burlington supply test equipment and a site for this Project.

REMARKS:

Provincial Lottery - Project 78-022-11

Ministry of the Environment
Ontario

PL-19

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: RESOURCE RECOVERY BRANCH *DATE:* December 1978

PROJECT TITLE: The Study of Gas Production and Migration at Closed Landfill Sites

KEY WORDS: Methane, Garbage Site, Landfill Site, Gas Production, Migration of Garbage Gas

PRINCIPLE INVESTIGATOR AND AFFILIATION Hydrology Consultants Ltd., 1125 Dundas St. E., Mississauga, Ontario

LIAISON OFFICER OR SUPERVISOR J. Petoia

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* X
MULTI-YEAR PROJECT X *CONCURRENT PROJECT* ——

OBJECTIVE:

DESCRIPTION:

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$285,700			

SOURCE OF FUNDS:
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER —— Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Provincial Lottery - Project 78-023-13

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT ADVISORY BOARD *DATE:* Dec. 15/78

PROJECT TITLE:

ASSESSMENT OF LITTER ABATEMENT PROGRAMS

KEY WORDS: litter

PRINCIPLE INVESTIGATOR AND AFFILIATION M. Rudolph

LIAISON OFFICER OR SUPERVISOR P.J. Crabtree

RESEARCH CATEGORY:

INTERNAL —— *GRANT* ——

UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* x

MULTI-YEAR PROJECT — *CONCURRENT PROJECT* —

OBJECTIVE: A broad cross-section of litter abatement programs undertaken by public or private agencies throughout North America and elsewhere will be investigated and assessed to evaluate their purpose, their degree of success and the conditions under which this was achieved.

DESCRIPTION: This project will:

1. Describe and review significant and diverse litter abatement programs undertaken by public or private agencies in Ontario, North America and elsewhere, principally by means of a literature search. Where available, include information on litter composition and any methodologies developed for assessing the social costs of littering.
2. Emphasise: the educational aspects of the programs, including the mechanisms used and the results; recent trends in litter abatement; the type of program (i.e., mandatory or voluntary) and the equipment used in relationship to the level of success and; the effects of the programs on other waste management practices.

DURATION OF PROJECT 1/4 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* Sept., 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	3,000	3,000	1/4	1/4

SOURCE OF FUNDS:

REGULAR WORK PROGRAM x *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

WMAB-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT ADVISORY BOARD *DATE:* Dec. 15/78

PROJECT TITLE: ASSESSMENT OF SIGNIFICANT EXISTING PROGRAMS OF RESIDENTIAL SOURCE SEPARATION

KEY WORDS: Source Separation

PRINCIPLE INVESTIGATOR AND AFFILIATION J. Opperman

LIAISON OFFICER OR SUPERVISOR P.J. Crabtree

RESEARCH CATEGORY:

INTERNAL —— *GRANT* ——

UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* x

MULTI-YEAR PROJECT —— *CONCURRENT PPOJECT* ——

OBJECTIVE:

to provide the Waste Management Advisory Board with guidance concerning need for new or expanded Ontario residential source separation programs. The information acquired in the study will also provide the Board and the Ministry with a measure against which existing and/or new programs can be evaluated.

DESCRIPTION:

A large number of residential source separation projects have been started recently in Canada and the U.S. These have evolved as changes have occurred in attitudes, markets, technology and as the pressures of resource depletion and waste disposal have increased.

Along the way, many inventive techniques have been applied to both the social and technical facets of the problems. Consequently, there are meaningful lessons to be learned from the successes and failures of both professional and volunteer groups in many locations.

This project will include review and assessment of significant existing and proposed residential source separation programs, including those in apartment buildings and rural areas, by public or private agencies.

DURATION OF PROJECT 1/4 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* June 1978

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	2,500	2,500	1/4	1/4

SOURCE OF FUNDS:

REGULAR WORK PROGRAM x *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

WMAB-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT ADVISORY BOARD *DATE:* Dec. 15/78

PROJECT TITLE: FISCAL AND REGULATORY METHODS OF REDUCING THE ENVIRONMENTAL IMPACTS OF URBAN WASTE (WITH PARTICULAR REFERENCE TO PACKAGING)

KEY WORDS: Solid Waste Reduction

PRINCIPLE INVESTIGATOR AND AFFILIATION Boston, Gilbert and Henry

LIAISON OFFICER OR SUPERVISOR P.J. Crabtree

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* x
MULTI-YEAR PROJECT -
CONCURRENT PROJECT -

OBJECTIVE:

to examine means of reducing the flow of urban waste and its associated environmental impacts and to relate the general principles to the specific case of packaging waste.

DESCRIPTION:

This project will:

1. explore the implications of the 'polluter pays' principle, and describe and analyse situations in which the general and specific application of this principle to public policy will provide incentives or disincentives to environmental improvement in terms of resource and total systems energy conservation, and of litter;
2. examine recent American application or proposed application of broad environmental impact taxes, against the background of the general discussion above, and assess the suitability of such action in Ontario, having particular regard to the legal and constitutional constraints on the province.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* March, 1979

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	15,000	15,000	3/4	3/4

SOURCE OF FUNDS:
REGULAR WORK PROGRAM x
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

WMAB-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT ADVISORY BOARD *DATE:* Dec. 15/78

PROJECT TITLE: AN EVALUATION OF HANDLING STATIONS IN WASTE RECLAMATION SYSTEMS

KEY WORDS: Source Separation - Handling Stations

PRINCIPLE INVESTIGATOR AND AFFILIATION: Resource Integration Systems

LIAISON OFFICER OR SUPERVISOR: P.J. Crabtree

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* x *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:

To investigate how to develop, through source separation mechanisms, the means of increasing the economic and social viability of recycling and reuse systems.

DESCRIPTION:

This project will:

1. develop the concept of primary and intermediate handling stations capable of receiving separated waste fractions from depots, local curbside collection schemes and from individuals, and assess the minimal and optimal arrangement of sources which might feed materials into these sorting stations.

2. determine suitable combinations of activities to be undertaken by primary and intermediate handling stations (including a consideration of handling re usable containers/materials for sale).

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* March, 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	20,000	20,000	1	1

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* x *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

WMAB-5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT ADVISORY BOARD *DATE:* Dec. 15/78

PROJECT TITLE: DEVELOPMENT OF ENVIRONMENTAL GUIDELINES FOR PACKAGING OF CONSUMER PRODUCTS - PHASE 2

KEY WORDS: Packaging, Environmental Guidelines

PRINCIPLE INVESTIGATOR AND AFFILIATION: Professor M.J. Hare

LIAISON OFFICER OR SUPERVISOR: P.J. Crabtree

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* x
MULTI-YEAR PROJECT *CONCURRENT PROJECT*

OBJECTIVE:

To refine guidelines (identified in Phase 1) defining the environmental criteria that are to be considered in the design of a package or packaging system.

DESCRIPTION:

The project will provide:

1. a refined version of environmental packaging guidelines for consumer products;
2. the integration of these refined guidelines to waste management goals;
3. the development of background information for each guidelinés (or set of guidelines) sufficient for use by industry and other interested parties.

DURATION OF PROJECT: 1 YEARS *PRESENT YEAR IS* final YEAR *REPORTING DATE:* May, 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEA
	14,000	2,000	2/3	1/6

SOURCE OF FUNDS:
REGULAR WORK PROGRAM x
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT ADVISORY BOARD *DATE:* Dec. 15/78

PROJECT TITLE: URBAN SOLID WASTE GENERATION IN ONTARIO - REPORT NO. 2 OF THE WASTE INDICES SUBCOMMITTEE

KEY WORDS: Solid Waste Generation in Ontario

PRINCIPLE INVESTIGATOR AND AFFILIATION: Currie, Coopers & Lybrand Ltd., Management Consultants

LIAISON OFFICER OR SUPERVISOR: P.J. Crabtree

RESEARCH CATEGORY:
INTERNAL —— *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* X *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:

To develop a reliable and comprehensive cost accounting system that will establish the rate of generation, total quantities, and cost of collection and/or disposal, for residential, commercial and industrial wastes handled by municipalities and private agencies across the province.

DESCRIPTION:

This is the second phase of a comprehensive study to develop a system for measuring the total amount of urban solid waste generated in Ontario, its constitution by separable fractions, the costs of collection and disposal in dollars, energy, labour and social terms, and the subsequent implementation and monitoring of the system as a means of assessing waste management performance.

DURATION OF PROJECT: 1 *YEARS* *PRESENT YEAR IS* final *YEAR* *REPORTING DATE:* February, 1978

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
66,000	5,000	not known	

SOURCE OF FUNDS:
REGULAR WORK PROGRAM x *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: T.E.I.G.A.

REMARKS:

The system has been developed with the cooperation of six municipalities in Ontario of various sizes having varying waste management systems in effect.

Ministry of the Environment
Ontario

WMAB-7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT ADVISORY BOARD *DATE:* Dec. 15/78

PROJECT TITLE:

IMPLEMENTATION MANUAL FOR RESIDENTIAL SOURCE SEPARATION

KEY WORDS: Source Separation

PRINCIPLE INVESTIGATOR AND AFFILIATION: J. Opperman

LIAISON OFFICER OR SUPERVISOR: P.J. Crabtree

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* x
MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

OBJECTIVE:

to produce an implementation manual to aid in the successful operation of residential source separation programs for the benefit of public or private agencies in Ontario wishing to undertake such a program.

DESCRIPTION:

Currently in Ontario there are over 50 depots for glass and/or cans, operated by volunteers, industry and municipalities, and approximately 11 separate curbside collection programs for glass and/or newspapers, operated by volunteers and municipalities. Some of the above are successful, many are unsuccessful, being unable to cover their operating costs. A frequent contributing factor to the lack of success of source separation programs is insufficient knowledge, by the person or persons undertaking the program, of the prerequisites in setting up such a program.

As the Board and the Ministry Branches often receive requests for advice on how to implement programs, and in order to thoroughly and effectively be able to respond to these requests, the Board has identified the need for an implementation manual.

DURATION OF PROJECT: 1 *YEARS* *PRESENT YEAR IS* final *YEAR* *REPORTING DATE* January, 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	6,000	6,000	1/3	1/3

SOURCE OF FUNDS:
REGULAR WORK PROGRAM x
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? YES - a manual

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

WMAB-8

RESEARCH AND DEVELOPMENT INVENTORY

RANCH: WASTE MANAGEMENT ADVISORY BOARD *DATE:* Dec. 15/78

ROJECT TITLE:

HARDWARE FOR SMALL-SCALE RESIDENTIAL COMPOSTING

EY WORDS: Composting - Residential

RINCIPLE INVESTIGATOR ND AFFILIATION K. Ho

IAISON OFFICER R SUPERVISOR P.J. Crabtree

ESEARCH ATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* X
MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

BJECTIVE: To develop designs of practical low-cost home composting devices to the point that their immediate manufacture and wide distribution will become inevitable within the market system.

ESCRIPTION:

Home-made composters have been used for generations, and in recent years there has been an increased interest among a certain segment of the population in do-it-yourself construction. However, there are many other people who are ready to use their kitchen and yard wastes for making compost, but for whom the construction of a composter is perceived to be a significant barrier. For these people, a commercially-produced unit would be the answer.

URATION F PROJECT 2 *YEARS* *PRESENT YEAR IS* final *YEAR* *REPORTING DATE* June, 1978

UDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	- 5,000	3,000	1/6	1/5

OURCE OF UNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

S A REPORT ANTICIPATED? YES

ARTICIPATION BY OTHER MINISTRIES:

EMARKS:

Ministry of the Environment

Ontario

WMAB-9

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT ADVISORY BOARD DATE: Dec. 15/78

PROJECT TITLE:

STUDY ON THE RECOVERY & USE OF WASTE MOTOR OIL

KEY WORDS: waste oil

PRINCIPLE INVESTIGATOR AND AFFILIATION: M. Rudolph

LIAISON OFFICER OR SUPERVISOR: P.J. Crabtree

RESEARCH CATEGORY: INTERNAL —— GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT x MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:

to identify and determine options available for the recovery and use of waste motor oils, in order to conserve petroleum, a non-renewable resource, and protect the human and natural environment.

DESCRIPTION:

The project will include:

- the identification, description and review of programs now in hand in Canada, the U.S. and other countries on the re-refining of waste motor oil for re-use as a petroleum product;
- the identification, description and review of other existing applications for waste motor oil, such as its use as a fuel or as a dust suppressant on roads;
- the description and review of the above programs will include careful consideration of technical, economic and social factors as well as environmental factors;
- data collection on the current Ontario scene including; the quantities of motor oil products, the distribution pattern, recovery rates for used oil, sources of generation, collection procedures, markets and market prices, and any non-market uses.

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS final YEAR — REPORTING DATE: July, 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	- 3,000	1,000	1/4	1/10

SOURCE OF FUNDS: REGULAR WORK PROGRAM x — SPECIAL MINISTRY FUNDING —— — JOINTLY FUNDED PROJECT —— — OTHER ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WMAB-10

RANCH: WASTE MANAGEMENT ADVISORY BOARD *DATE:* Dec. 15/78

ROJECT TITLE: INVESTIGATION OF ATTITUDES TOWARDS RECYCLED AND OTHER POST-CONSUMER PRODUCTS - PHASE I

EY WORDS: Waste, attitudes to recycling

RINCIPLE INVESTIGATOR ND AFFILIATION C. Hausman

IAISON OFFICER R SUPERVISOR P.J. Crabtree

ESEARCH ATEGORY: *INTERNAL* —— *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* x *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

BJECTIVE: to provide guidance to the Waste Management Advisory Board as to effective means of increasing the use of secondary materials, thereby reducing the flow of waste and conserving resources.

ESCRIPTION: There are four major objectives of Phase I of the project:

1. to define and analyse the attitudes of selected representatives from Ontario's manufacturing, wholesaling and retailing industries, associated labour groups, various levels of government where appropriate, and the general public;
2. to document official positions taken by industry, labour and consumer groups concerning policy on post-consumer waste;
3. to suggest methods for breaking down non-economic barriers to greater use of post-consumer products;
4. to indicate fruitful areas for further work in Phase II of the project.

URATION F PROJECT 1 *YEARS* *PRESENT YEAR IS* final *YEAR* *REPORTING DATE* Oct. 1979

UDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	2,000	2,000	1/6	1/6

OURCE OF UNDS: *REGULAR WORK PROGRAM* x *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

S A REPORT ANTICIPATED? YES

ARTICIPATION BY OTHER MINISTRIES:

EMARKS:

Ministry of the Environment

WMAB-11

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT ADVISORY BOARD *DATE:* DEC. 15, 1978

PROJECT TITLE:

EVOLUTION OF THE THROWAWAY SOCIETY

KEY WORDS: Throwaway Society

PRINCIPLE INVESTIGATOR AND AFFILIATION Development Education Centre

LIAISON OFFICER OR SUPERVISOR P.J. Crabtree

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* x
MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

OBJECTIVE:

to provide the Waste Management Advisory Board with an analysis of the evolution of the 'throwaway society,' so that the Board can develop better strategies for reversing the trend.

DESCRIPTION:

The project will:

1. provide an historical picture, covering roughly the last half century of the development of wasteful practices, methods and products in North American, and particularly Ontario society, and the relationship to the waste stream;
2. describe and analyse selected critical points in this development at which social, institutional and economic motivations caused particular wasteful or conserving practices;
3. describe and analyse current social and institutional forces in Ontario related to these critical points;
4. set forth the implications of the above analysis, in terms of possible alternative government strategies in creating continuing, practical, environmentally-oriented pressure on future wasteful developments.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* final *YEAR* *REPORTING DATE* March, 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	10,000	10,000	not known	

SOURCE OF FUNDS:
REGULAR WORK PROGRAM x
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WMAB-12

ANCH: WASTE MANAGEMENT ADVISORY BOARD

DATE: Dec. 15/78

OJECT TITLE: INVESTIGATION AND IMPROVEMENT OF GOVERNMENT WASTE MANAGEMENT PRACTICES

Y WORDS: Waste Management in Government

INCIPLE INVESTIGATOR D AFFILIATION: J. McGinnis

AISON OFFICER SUPERVISOR: P.J. Crabtree

SEARCH TEGORY: INTERNAL —— GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT X MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

JECTIVE: to identify areas within the Ontario Government and its agencies where improvements could be made in reduction, re-use and recycling practices, and to suggest key points where a more detailed examination of the feasibility of implementation should be considered by the Ministry or agency involved.

SCRIPTION: A close examination of possible improvements in the Ontario Government's own waste management practices is to be undertaken by a person who is familiar with the broad range of possible environmental improvements, but who is not preoccupied with day-to-day operations.

The identification of specific areas of possible improvement will then make it possible for the operating authority in each branch or agency to examine the feasibility of particular reduction, re-use or recycling activities, and thereby to structure its own waste management improvement program more easily and effectively.

RATION PROJECT: 1 YEARS — PRESENT YEAR IS final YEAR — REPORTING DATE: Dec. 1978

DGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	5,000	5,000	1/4	1/4

URCE OF NDS: REGULAR WORK PROGRAM x — SPECIAL MINISTRY FUNDING —— — JOINTLY FUNDED PROJECT —— — OTHER ——

A REPORT ANTICIPATED? YES

RTICIPATION BY OTHER MINISTRIES: Agriculture & Food, Correctional Services, Government Services, REvenue, TEIGA, Transportation & Communication, Housing

MARKS:

Ontario Environment

RESEARCH AND DEVELOPMENT INVENTORY

WMAB-13

BRANCH: Waste Management Advisory Board

DATE: Dec. 15/7

PROJECT TITLE: Evaluation of Environmental Characteristics of Packaging Materials

KEY WORDS: Packaging, environmental characteristics

PRINCIPLE INVESTIGATOR AND AFFILIATION: Stevenson & Kellogg, Ltd.

LIAISON OFFICER OR SUPERVISOR: P. J. Crabtree

RESEARCH CATEGORY:

INTERNAL —	UNSOLICITED CONTRACT —	MULTI-YEAR PROJEC
GRANT —	SOLICITED CONTRACT X	CONCURRENT PROJEC

OBJECTIVE:

To identify and develop environmental characteristics for the major packaging materials, and to investigate the impact of these characteristics on a selected number of packages and packaging systems.

DESCRIPTION:

The project will collect and develop (when necessary) the environmental attributes for the basic packaging materials, and for a number of representative packages and packaging systems.

Further environmental input will be obtained for each major packaging material (e.g. embodied energy content, renewable versus non-renewable resource input, technological aspects of recycling potential).

In another dimension, the specific package and the package system become important. In this content, packaging will include primary, secondary and tertiary packaging for consumer products. The project will identify which consumer product sectors generate significant levels of solid waste.

DURATION OF PROJECT: 2+ YEARS — PRESENT YEAR IS second YEAR — REPORTING DATE: June, 1978 (1st phase)

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YE
	23,000	3,000	1	1/6

SOURCE OF FUNDS:

REGULAR WORK PROGRAM X	SPECIAL MINISTRY FUNDING —	JOINTLY FUNDED PROJECT —	OTHER

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management

DATE: October 5, 1978

PROJECT TITLE: Use of Refuse Derived Fuel in Cement Kilns

KEY WORDS: energy, refuse derived fuel (RDF), solid waste

PRINCIPLE INVESTIGATOR AND AFFILIATION: P. J. Provias, Waste Management, MOE
R. M. Brannen, Canada Cement LaFarge Limited

LIAISON OFFICER OR SUPERVISOR: B. I. Boyko, Waste Utilization, MOE

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT X — CONCURRENT PROJECT —

OBJECTIVE:

To investigate the use of refuse derived fuel (RDF) as a fuel supplement in cement kiln operation.'

DESCRIPTION:

A demonstration project using RDF as a supplement to fossil fuels will be conducted at the Company's Woodstock plant. RDF, prepared at the Experimental Plant for Resource Recovery, will be used up to a maximum of 50 percent of the fuel energy supply, if feasible. Ministry funding will cover the engineering, supply and installation of the materials receiving and pneumatic handling system. Air emission testing prior to and during the firing phases of the study will be conducted by the Ministry.

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS 3rd YEAR — REPORTING DATE: Sept./79

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$290,000	0	0.5	0.25

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: None

REMARKS: Initial firing of refuse derived fuel to commence in late November, 1978

Ministry of the Environment

Ontario

WM-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management

DATE: October 5, 1978

PROJECT TITLE: Experimental Plant for Resource Recovery

KEY WORDS: resource recovery, solid waste management

PRINCIPLE INVESTIGATOR AND AFFILIATION: N. R. Ahlberg, Waste Utilization Section, Waste Management Branch

LIAISON OFFICER OR SUPERVISOR: B.I. Boyko, Waste Utilization Section, Waste Management Branch

RESEARCH CATEGORY: INTERNAL -X- GRANT ---- UNSOLICITED CONTRACT ---- SOLICITED CONTRACT ---- MULTI-YEAR PROJECT ---- CONCURRENT PROJECT ----

OBJECTIVE:

To evaluate unit processes for resource recovery; to produce working quantities of recovered materials; to establish markets for recovered resources; to establish costs for resource recovery processes and systems; to provide facilities in which external resource recovery research studies can be conducted.

DESCRIPTION:

A 270 tonne/day experimental resource recovery plant, also incorporating a 540 tonne/day transfer station, is currently in operation in North York. Unit processes included in this facility are: shredding, air separation, air classification, magnetic separation, screening, composting, compaction, baling, conveying systems, and energy recovery. Recovered materials will include paper, cardboard, ferrous metals, non-ferrous metals, glass, clean paper fibre, organic fibre, and compost.

DURATION OF PROJECT: Capital Works ---- YEARS PRESENT YEAR IS 4th ---- YEAR REPORTING DATE ----

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$15 million capital	$2 million operating		$4.25 million

SOURCE OF FUNDS:

REGULAR WORK PROGRAM	SPECIAL MINISTRY FUNDING	JOINTLY FUNDED PROJECT	OTHER
-XX-	----	----	----

IS A REPORT ANTICIPATED? Project reports issued through Waste Management Branch

PARTICIPATION BY OTHER MINISTRIES: ~~XXX~~

REMARKS:

$1.5 million revenue projected

Ministry of the Environment

Ontario

WM-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management

DATE: October 5, 1978

PROJECT TITLE: An investigation of the environmental health hazards associated with road oiling - Phase II

KEY WORDS:

PRINCIPLE INVESTIGATOR AND AFFILIATION: L. S. Love & Associates Canada Ltd.
Mr. F. Guillaume

LIAISON OFFICER OR SUPERVISOR: F. R. Phoenix

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT ~~XX~~ *CONCURRENT PROJECT* ——

OBJECTIVE:

To evaluate the potential hazard to human health and the environment in general.

DESCRIPTION:

Proposed to study contaminants in used oil utilized for dust suppression, their mode of entry into the environment and the degree of dispersal.

DURATION OF PROJECT: 2 *YEARS*
PRESENT YEAR IS: 2nd *YEAR*
REPORTING DATE: March, 1979

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		$66,066		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ~~XX~~ Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

MT & C

REMARKS:

Ministry of the Environment

Ontario

WM-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT *DATE:* November 24,1978

PROJECT TITLE:

Autothermal Sludge Incineration Study

KEY WORDS:

Autothermal, sludge, incineration

PRINCIPLE INVESTIGATOR AND AFFILIATION J.F. MacLaren Ltd.

LIAISON OFFICER OR SUPERVISOR S.A. Black Wastewater Treatment Section

RESEARCH CATEGORY:

INTERNAL —— *GRANT* ——

UNSOLICITED CONTRACT X *SOLICITED CONTRACT* ——

MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

OBJECTIVE:

Conduct pilot scale incineration studies to determine optimum operation conditions to maximize efficiencies of the incineration process and to extend this information to include sludges from Hamilton, London and Mississauga.

DESCRIPTION:

The Wastewater Technology Centre of Environment Canada will pay for cost of modifications to pilot scale multiple hearth incinerator and make the pilot unit available to James F. MacLaren for pilot tests. The firm of James F. MacLaren would be responsible for pilot tests, all testing and preparation of a report.

The final report would be issued as a joint Provincial-Federal document.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 78-79 *YEAR* *REPORTING DATE* Interim Dec.31/78

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	30,000	15,000		

SOURCE OF FUNDS:

REGULAR WORK PROGRAM X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* XX *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

Ministry of Energy

REMARKS: Cost sharing agreement with C.M.H.C. to fund the total study on a 50-50 basis. The Provincial share of the study costs is split 50-50 with Ministry of Energy and Environment.

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WR-1

BRANCH: Water Resources

DATE: December 3, 1978

PROJECT TITLE: Retention of nutrients and metals in lake sediments

KEY WORDS: Sediments, Sedimentation, Nutrients, Lead

PRINCIPLE INVESTIGATOR AND AFFILIATION: P.J. Dillon, Head
Limnology Unit

LIAISON OFFICER OR SUPERVISOR:

RESEARCH CATEGORY:
INTERNAL X — *UNSOLICITED CONTRACT* — — *MULTI-YEAR PROJECT* —
GRANT — — *SOLICITED CONTRACT* — — *CONCURRENT PROJECT* —

OBJECTIVE:

To determine the accumulation rate of nutrients and heavy metals in Precambrian lakes.

DESCRIPTION:

Sediment profiles of nutrient and heavy metals (Pb, Cu, Ni, Cd) have been measured for approximately 15 lakes. These sediments will be dated using the Pb^{210} technique. Correction for different sedimentation rates and differing sediment thickness with location in the lake can be made by reference to Pb profiles, Pb input via precipitation and a meromictic (undisturbed) sediment profile.

DURATION OF PROJECT: 4 *YEARS* — *PRESENT YEAR IS* 2 *YEAR* — *REPORTING DATE:* 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	20K	4.0K	0.4	0.1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X — *SPECIAL MINISTRY FUNDING* — — *JOINTLY FUNDED PROJECT* — — *OTHER* —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
No

REMARKS:

Ministry of the Environment
Ontario

WR-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: December, 1978

PROJECT TITLE:

Long term studies of an acidic lake

KEY WORDS: acidification, Clearwater Lake, variation, chemistry, biology, annual variation, seasonal variation

PRINCIPLE INVESTIGATOR AND AFFILIATION: N. Yan

LIAISON OFFICER OR SUPERVISOR: P. Dillon

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT X — CONCURRENT PROJECT —

OBJECTIVE:

To study long-term limnological variability of an acidic lake (Clearwater Lake)

DESCRIPTION:

Limnological monitoring of Clearwater Lake, an acidic lake near Sudbury continued in 1978. This is the longest running in-depth study of an acidic lake in the world and should serve as a yardstick against which the chemical and biological constitution of other acidic lakes can be assessed.

DURATION OF PROJECT: 7 YEARS — PRESENT YEAR IS 6 YEAR — REPORTING DATE: March 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	60K	20K	3	0.5

SOURCE OF FUNDS: REGULAR WORK PROGRAM — SPECIAL MINISTRY FUNDING X — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? One report accepted by Water, Air, Soil Pollution
Others to follow

PARTICIPATION BY OTHER MINISTRIES:

None

REMARKS:

MOE 1254 (7/75)

Ministry of the Environment

Ontario

WR-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: December, 1978

PROJECT TITLE:

S.E.S. - Watershed hydrogeology

KEY WORDS:

streams, hydrology, geology, Nelson Lake, substance budgets

PRINCIPLE INVESTIGATOR AND AFFILIATION: N. Yan

LIAISON OFFICER OR SUPERVISOR: P. Dillon

RESEARCH CATEGORY: INTERNAL X — GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:

To study the effects of watershed geology on stream chemistry

DESCRIPTION:

The gauged streams of Nelson Lake drain several different surficial and bedrock geological formations. Comparison of stream chemistry with geology will facilitate interpretation of the potential effect of acidic precipitation on lakes of different geological setting.

DURATION OF PROJECT: 4 YEARS — PRESENT YEAR IS: 3 YEAR — REPORTING DATE: March, 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	30K	10K	2	0.5

SOURCE OF FUNDS: REGULAR WORK PROGRAM —— SPECIAL MINISTRY FUNDING X — JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED?

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WR-4

BRANCH: Water Resources

DATE: December, 1978

PROJECT TITLE:

S.E.S. - Nutrient Loading Studies

KEY WORDS: phosphorus, nitrogen, acid lakes, phytoplankton, zooplankton, nutrients, pH

PRINCIPLE INVESTIGATOR AND AFFILIATION: N. Yan

LIAISON OFFICER OR SUPERVISOR:

RESEARCH CATEGORY: INTERNAL ---- X GRANT ---- UNSOLICITED CONTRACT ---- SOLICITED CONTRACT ---- MULTI-YEAR PROJECT ---- X CONCURRENT PROJECT ----

OBJECTIVE:

to study the response of increased nutrients loadings to lakes that have been neutralized (Middle, Hannah), a lake of very low pH (Mountaintop) and a lake of intermediate pH (Tower).

DESCRIPTION:

The nutrient concentrations in acid and neutralized lakes are very low. Nitrogen and phosphorus fertilizers are added to the lake under controlled conditions and the productivity response is measured. Nutrients were added to acid lakes to assess the potential productivity under acid-stressed conditions.

DURATION OF PROJECT: 5 YEARS PRESENT YEAR IS: 4 YEAR REPORTING DATE: March, 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	70K	24K	6	1.5

SOURCE OF FUNDS: REGULAR WORK PROGRAM ---- SPECIAL MINISTRY FUNDING X JOINTLY FUNDED PROJECT ---- OTHER ----

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: None

REMARKS:

MOE 1213 6/78

Ministry of the Environment
Ontario

WR-5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: December, 1978

PROJECT TITLE:

S.E.S. - Trout Survival in Neutralized Lakes

KEY WORDS:

Rainbow trout, Middle Lake, Lohi Lake, Panache Lake, toxicity, copper, cages

PRINCIPLE INVESTIGATOR AND AFFILIATION: N. Yan

LIAISON OFFICER OR SUPERVISOR: P. Dillon

RESEARCH CATEGORY: INTERNAL X — GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT X — CONCURRENT PROJECT ——

OBJECTIVE:

To determine if water chemistry of Middle and Lohi Lakes after neutralization is suitable for rainbow trout survival

DESCRIPTION:

Cages were submerged in Middle, Lohi and Panache Lakes and rainbow trout were planted in the cages. Rates of mortality were noted and accumulation rates of heavy metals in the fish were subsequently calculated.

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS 2 YEAR — REPORTING DATE: March, 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	27K	6K	1-1/2	0.4

SOURCE OF FUNDS: REGULAR WORK PROGRAM —— SPECIAL MINISTRY FUNDING X — JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

None

REMARKS:

Ministry of the Environment

Ontario

WR-6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources *DATE:* December, 1978

PROJECT TITLE:

SES - Reacidification of Lohi Lake

KEY WORDS: acidification, chemistry, biology, Lohi Lake, neutralization

PRINCIPLE INVESTIGATOR AND AFFILIATION N. Yan

LIAISON OFFICER OR SUPERVISOR

RESEARCH CATEGORY:

INTERNAL X	*UNSOLICITED CONTRACT* ——	*MULTI-YEAR PROJECT* X
GRANT ——	*SOLICITED CONTRACT* ——	*CONCURRENT PROJECT* ——

OBJECTIVE:

to document chemical and biologic changes that accompany reacidification of a lake that had been neutralized.

DESCRIPTION:

Lohi Lake was neutralized once per year in 1973, 1974 and finally in 1975. The lake pH and buffering capacity are currently declining. The rate of decline and changes that accompany the decline are being monitored.

DURATION OF PROJECT 4 *YEARS* *PRESENT YEAR IS* 3 *YEAR* *REPORTING DATE* March, 1980

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	60K	15K	2	0.5

SOURCE OF FUNDS:

REGULAR WORK PROGRAM ——	*SPECIAL MINISTRY FUNDING* X	*JOINTLY FUNDED PROJECT* ——	*OTHER* ——

IS A REPORT ANTICIPATED?

Yes

PARTICIPATION BY OTHER MINISTRIES:

None

REMARKS:

Ministry of the Environment

Ontario

WR-7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: December/78

PROJECT TITLE:

SES - extensive lake resurveys

KEY WORDS:

synoctic surveys, aircraft sampling, pH, lakes, Sudbury area

PRINCIPLE INVESTIGATOR AND AFFILIATION: N. Yan

LIAISON OFFICER OR SUPERVISOR: P. Dillon

RESEARCH CATEGORY: INTERNAL X — GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT X — CONCURRENT PROJECT ——

OBJECTIVE:

Continued monitoring of chemistry of selected lakes of 'critical' pH or buffering capacity sampled from 1973-1975 Extensive lakes survey

DESCRIPTION:

In August, 1978 11 lakes from the 1973-1975 Extensive Lakes Survey that had been sampled in 1977 were resampled by airplane.

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS 2 YEAR — REPORTING DATE: March, 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	30K	9K	1	0.1

SOURCE OF FUNDS: REGULAR WORK PROGRAM —— SPECIAL MINISTRY FUNDING X — JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes, 1980-81

PARTICIPATION BY OTHER MINISTRIES:

None

REMARKS:

Ministry of the Environment

Ontario

WR-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: Dec. 1978

PROJECT TITLE:

S.E.S. - Substance Budgets

KEY WORDS: hydrologic budgets, substance budgets, acidification rates, rates of recover. Middle, Hannah, Lohi, Clearwater, Nelson Lakes

PRINCIPLE INVESTIGATOR AND AFFILIATION: N. Yan, Limnology & Toxicity

LIAISON OFFICER OR SUPERVISOR: P. Dillon

RESEARCH CATEGORY:

INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X — *CONCURRENT PROJECT* ——

OBJECTIVE:

To construct hydrologic and substance budgets to describe nutrient turnover rates, acidification rates, expected duration of treatments and recovery rates of acidified lakes following reduced inputs of strong acids.

DESCRIPTION:

Stream controls have been constructed in and continuous water level recorders placed in inlets and outlets of Middle, Hannah, Lohi, Clearwater and Nelson Lakes. Data from these and precipitation gauges will be computerized and used to construct hydrologic budgets for the five lakes. These data and chemical data will be used to construct substance budgets.

DURATION OF PROJECT: 5 *YEARS* — *PRESENT YEAR IS* 4 *YEAR* — *REPORTING DATE:* March, 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	400	125K	10	3

SOURCE OF FUNDS:

REGULAR WORK PROGRAM —— *SPECIAL MINISTRY FUNDING* X — *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

None

REMARKS:

Ministry of the Environment
Ontario

WR-9

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: 28/11/78

PROJECT TITLE: Characterization of Industrial Effluents by chemical techniques

KEY WORDS: selective removal, toxicants, solvents, resin beds

PRINCIPLE INVESTIGATOR AND AFFILIATION: James Reinke - Toxicity Unit

LIAISON OFFICER OR SUPERVISOR: Gord Craig

RESEARCH CATEGORY:
INTERNAL — X
GRANT —
UNSOLICITED CONTRACT —
SOLICITED CONTRACT —
MULTI-YEAR PROJECT —
CONCURRENT PROJECT —

OBJECTIVE:

Establish procedures which may be used for the selective removal of toxicants from complex industrial wastes. The result is a complete evaluation of all toxic materials in the effluent so abatement programs can be designed accordingly.

DESCRIPTION:

Treatment of raw industrial wastes with solvents and/or ion exchanges, and/or adsorbent/absorbent resins in order to selectively remove specific contaminants and relate these activities to changes in the toxicity.

DURATION OF PROJECT: 1.5 YEARS
PRESENT YEAR IS: 1 YEAR
REPORTING DATE: April, 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	4K	2K	2	1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM — X
SPECIAL MINISTRY FUNDING —
JOINTLY FUNDED PROJECT —
OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Ministry of the Environment
Ontario

WR-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources *DATE:* Nov. 1978

PROJECT TITLE:
Phytoplankton of the nearshore Great Lakes

KEY WORDS:
Phytoplankton, algae, Great Lakes

PRINCIPLE INVESTIGATOR AND AFFILIATION K.H. Nicholls and G.J. Hopkins

LIAISON OFFICER OR SUPERVISOR

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
To determine the spatial and temporal characteristics of phytoplankton of the nearshore Great Lakes with special emphasis on physical-chemical processes as controlling factors.

DESCRIPTION:
Municipal water supply intakes at 12 locations around the Canadian portion of the Great Lakes are used to collect nearshore water samples at weekly intervals for phytoplankton analysis. The unique collection method permits year round observation of phytoplankton and chemical variables. Special attention is given to the joint Canadian - U.S.A. efforts to reduce phosphorus loading from municipal waste treatment plants and the resultant effects on the limnology of the nearshore Great Lakes.

DURATION OF PROJECT on-going *YEARS* *PRESENT YEAR IS* ——— *YEAR* *REPORTING DATE* annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		20K		2.0

SOURCE OF FUNDS: CAnada-Ontario Agreement *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* X —— *OTHER* ——

IS A REPORT ANTICIPATED? Reports and journal publications

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

WR-11

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: Nov. 1978

PROJECT TITLE:

Project Quinte

KEY WORDS:

Bay of Quinte, eutrophication, phosphorus, phytoplankton

PRINCIPLE INVESTIGATOR AND AFFILIATION K.H. Nicholls, G.W. Robinson

LIAISON OFFICER OR SUPERVISOR

RESEARCH CATEGORY:

INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X — *CONCURRENT PROJECT* ——

OBJECTIVE:

(sub-goal): To examine the composition and biomass of phytoplankton in the Bay of Quinte with reference to physical-chemical-biological factors before and after reduced loadings of phosphorus from municipal and treatment plants.

DESCRIPTION:

Study began in 1972 with participants from 4 provincial and federal agencies responsible for 16 subject areas describing the function of the Bay of Quinte. The working hypothesis is that phosphorus loading is the major factor controlling the biology of the Bay of Quinte. The overall goal of Project Quinte is to describe the physical-chemical-biological processes persuant to rehabilitation of the fishery of the Bay of Quinte following controls on P loading.

DURATION OF PROJECT on-going *YEARS* — *PRESENT YEAR IS* ——— *YEAR* — *REPORTING DATE* annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$20,000		1.5

SOURCE OF FUNDS:

REGULAR WORK PROGRAM X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* X — *OTHER* ——

IS A REPORT ANTICIPATED? Annual reports and journal publications

PARTICIPATION BY OTHER ~~MINISTRIES~~:

AGENCIES: Ont. Min. Natural Resources, Environ. Canada (Fisheries & Marine Service) Queens Univ., Guelph Univ.

REMARKS:

Ministry of the Environment
Ontario

WR-12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: Nov. 1978

PROJECT TITLE:

Metals in Lake

KEY WORDS:

Heavy metals, phytoplankton, zooplankton, precipitation

PRINCIPLE INVESTIGATOR AND AFFILIATION

S.L. Wong, R. Strus

LIAISON OFFICER OR SUPERVISOR

RESEARCH CATEGORY:

INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To examine the sublethal and chronic toxic effects of heavy metals on algae and micro-crustaceans and factors determining rates of accumulation in the lower trophic levels of lakes.

DESCRIPTION:

Studies with unialgal and mixed algal cultures are underway to determine the influence of metal species (singly and in combination) on metal accumulation in algal cells. By examining the inter-relationships among several influencing factors (chelating capacity, growth rate, biomass, species composition, etc) it is expected that a "metal accumulation coefficient" can be derived which should have some predictive value for assessment of the sublethal impact of heavy metal input to natural waters from precipitation and land runoff. Similar, but less detailed studies with Daphnia pulex (zooplankter) are in progress.

DURATION OF PROJECT 3 *YEARS* — *PRESENT YEAR IS* 1 *YEAR* — *REPORTING DATE* ——

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	120K	40K	10	2

SOURCE OF FUNDS:

REGULAR WORK PROGRAM X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Reports and journal publications

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

WR-13

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources *DATE:* Nov. 1978

PROJECT TITLE:

Algal Taxonomy

KEY WORDS: algae, lakes, food-chain

PRINCIPLE INVESTIGATOR AND AFFILIATION K.H. Nicholls

LIAISON OFFICER OR SUPERVISOR

RESEARCH CATEGORY: *INTERNAL GRANT* — X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — X — *CONCURRENT PROJECT* —

OBJECTIVE:

To determine the Taxonomy of several presently undescribed algal species in Ontario lakes.

DESCRIPTION:

It is now clear that algal species composition is related to lake trophic state and buffering capacity. Acidic lakes on the Precambrian Shield contain several species of algae which apparently have not yet been described and therefore cannot be identified. It is difficult to interpret results from remedial or enhancement programmes unless the species composition of these lakes is better known.

Example: Chrysochromulina breviturrita (Nicholls, J. Phycol. 14:499-505) is proving to be very widespread in Precambrian Shield Lakes. It has now been found in 17 lakes, none of which has a pH >7.0. This species has contributed as much as 20% of the total algal biomass and is undoubtedly important in the food chain of acidic lakes. Work on other species is in progress as data are available.

DURATION OF PROJECT on-going *YEARS* *PRESENT YEAR IS* ——— *YEAR* *REPORTING DATE* as data are available

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
				0.5

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* — X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Reports and journal pub'ns

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

WR-14

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources *DATE:* 1978

PROJECT TITLE:

Acidification of Lakes

KEY WORDS: Acid Lakes, Atmospheric Inputs, pH depression

PRINCIPLE INVESTIGATOR AND AFFILIATION P. Dillon

LIAISON OFFICER OR SUPERVISOR

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X — *CONCURRENT PROJECT* ——

OBJECTIVE:

To determine the effects on Precambrian Lakes of atmospheric acid and metal inputs.
To develop the basis of abatement programs and possible mitigative techniques.

DESCRIPTION:

Extra data are being collected from the Lakeshore Capacity Study (see separate Inventory item) and the Sudbury Environmental Study (see separate Inventory items) to meet the objectives as they apply to the Muskoka-Haliburton area.
Work in concentrating on collection of atmospheric deposition data and effects during spring snow melt.
Water chemistry data are being collected from a large number of lakes to determine the present status and the likely future changes brought about by "acid rain".

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* ——

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	75K	50K	3	2

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

MNR

REMARKS:

A new and expanded program will be initiated in 1979 which will replace this project.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WR-15

BRANCH: Water Resources

DATE: November 28, 1978

PROJECT TITLE:
LAKESHORE CAPACITY STUDY - TROPHIC STATUS COMPONENT

KEY WORDS: TROPHIC STATUS, PHOSPHORUS, CHEMICAL BUDGETS, MODEL, RECREATIONAL DEVELOPMENT

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. D.A. Jeffries
Limnology and Toxicity Section

LIAISON OFFICER OR SUPERVISOR: Dr. P.H. Dillon, Head
Limnology Unit

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X — *CONCURRENT PROJECT* ——

OBJECTIVE: The objective of the Lakeshore Capacity Study is to assess the impact of recreational development on shield lakes typical of those in Muskoka-Haliburton and develop a model or rationale by which planners may make informal decisions regarding future development in this area. The Trophic Status Component (in particular) is studying the effect of development on water quality (chemical, aesthetic, biological).

DESCRIPTION: Limnology Unit staff working within the Trophic Status Component are developing predictive models for Muskoka-Haliburton lakes by:

1) measuring the chemical budgets of selected lakes and determining what portion of the chemical inputs can be attributed to development, and
2) measuring the trophic status of selected lakes before and after scheduled development and relating observed changes to the development.

In order to measure the chemical budgets, the following factors are being investigated:

1) lake hydrology,
2) lake and stream chemistry,
3) precipitation chemistry and
4) influences of watershed geology and land use etc.

Trophic status of the lakes is assessed through consideration of algal biomass, water clarity oxygen demand, chlorophyll concentrations, etc. The most important models are one and three box lake models which predict phosphorus concentration from measured phosphorus input and output. Trophic status is expected to be primarily a function of this limiting nutrient. Similarly chemical budgets for many other substances are also being determined.

DURATION OF PROJECT: 6 *YEARS* — *PRESENT YEAR IS* 4 *YEAR* — *REPORTING DATE:* March 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	1.2 m	204 K	36	6

SOURCE OF FUNDS: Ontario Ministry of Housing
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
Ministry of Housing & Ministry of Natural Resources

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WR-16

BRANCH: Water Resources

DATE: November 28, 1978

PROJECT TITLE:

CAUSES OF THE DECLINE OF EURASIAN WATERMILFOIL

KEY WORDS: DECLINE, EURASIAN WATERMILFOIL

PRINCIPLE INVESTIGATOR AND AFFILIATION
Mrs. I. Wile
Limnology & Toxicity Section

LIAISON OFFICER OR SUPERVISOR
Mrs. I. Wile
Limnology & Toxicity Section

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE: To investigate possible causes for the recent decline of Eurasian watermilfoil in some Ontario lakes.

DESCRIPTION: Potential causes for the decline are being investigated. These include:

1) sub-lethal pesticide levels
2) depletion of an essential nutrient
3) disease organisms
4) impairment of Total Non Structural Carbohydrate storage for overwintering due to chemical or mechanical control of the plant.

DURATION OF PROJECT 2 *YEARS* — *PRESENT YEAR IS* 2 *YEAR* — *REPORTING DATE* 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	20	10	1	½

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:
NO

REMARKS: Investigation was generated in response to public interest in the decline of the problem aquatic plant and in view of future implications to large plant control programs.

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WR-17

BRANCH: WATER RESOURCES

DATE: November 28. 1978

PROJECT TITLE:

USE OF MARSHES FOR SEWAGE PURIFICATION

KEY WORDS: MARSHES, SEWAGE

PRINCIPLE INVESTIGATOR AND AFFILIATION: Mrs. I. Wile, Limnology & Toxicity Section

LIAISON OFFICER OR SUPERVISOR: Mrs. I. Wile, Limnology & Toxicity Section

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* X — *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE: To determine the potential of natural and artificial marshes for sewage (raw and secondary) renovation.

DESCRIPTION: A 7 cell artificial marsh will be built in Listowel. A small quarter acre natural marsh plot will be isolated in Bradford. Sewage effluent will be applied to these systems and the net retentions of N, P, BOD, metals will be established. Also, bacterial reductions will be examined. The role of the various compartments (plant, soils, litter) in the purification process will be assessed.

DURATION OF PROJECT: 3 YEARS

PRESENT YEAR IS: Preliminary YEAR (starts 1979)

REPORTING DATE: As info. is generated

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	195	65	2	1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Other participating groups include London Region-MOE, Wastewater Treatment Sectic MOE and Hydrology and Monitoring-Water Resources also the Town of Listowel.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WR-18

BRANCH: WATER RESOURCES

DATE: November 28, 1978

PROJECT TITLE: COMPARISON OF RAINBOW TROUT AND FLAGFISH YOLK SAC FRY SENSITIVITY TO REFERENCE TOXICANTS.

KEY WORDS: RAINBOW TROUT, FLAGFISH, YOLK SAC FRY, REFERENCE TOXICANTS, SUBLETHAL EFFECTS, BIOASSAY.

PRINCIPLE INVESTIGATOR AND AFFILIATION: Mr. G.R. Craig, Limnology & Toxicity Section

LIAISON OFFICER OR SUPERVISOR: Mr. G.R. Craig, Limnology & Toxicity Section

RESEARCH CATEGORY: *INTERNAL* X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE: To develop a sublethal bioassay tool based on a sensitive life stage that is available throughout the year and reference the use of this life stage to that of the standard bioassay fish used in Canada.

DESCRIPTION: The sensitivities of rainbow trout and flagfish yolk sac to selected toxicants and complex industrial wastes will be compared and relationships established. This sublethal evaluation method will meet the future demands of regulatory industrial effluents that meet the lethal requirements for discharge but may produce sublethal effects in aquatic organisms.

DURATION OF PROJECT: 2 *YEARS* — *PRESENT YEAR IS* 2 *YEAR* — *REPORTING DATE* November 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	20 K	10 K	1	½

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Journal publication

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WR-19

BRANCH: WATER RESOURCES

DATE: November 28, 1978

PROJECT TITLE:
EVALUATION OF BIOASSAY FISH LOADING RATES

KEY WORDS: TOXICITY TEST, BIOASSAY METHODOLOGY, RAINBOW TROUT, AMMONIA, THALIUM, COPPER, INDUSTRIAL EFFLUENTS.

PRINCIPLE INVESTIGATOR AND AFFILIATION Mr. G.R. Craig & Ms. G. Beggs
Limnology & Toxicity Section

LIAISON OFFICER OR SUPERVISOR

RESEARCH CATEGORY: *INTERNAL* X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE: To substantiate recommended bioassay methods as outlined by the Ministry.

DESCRIPTION: Rainbow trout were exposed to three chemical compounds (copper sulphate, ammonia chloride and thalium sulphate) and three complex industrial wastes (chemical manufacturing, steel and pulp and paper). The 96-hr LC_{50}'s were determined for each of 0.1, 0.5, 1, 2 and 3 l/g/d fish loading rates. The 0.5 l/g/d fish loading rate produced LC_{50}'s equivalent to those produced at higher loading rates. Median survival time data indicated variable responses and was not consistent for any fish loading density.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* Dec. 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	5 K		¼	

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Journal Publication

PARTICIPATION BY OTHER MINISTRIES:
None

REMARKS:

Ministry of the Environment
Ontario

WR-20

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology & Monitoring

DATE: August 23, 1978

PROJECT TITLE:

International Great Lakes Consumptive Uses

KEY WORDS:

IJC; Great Lakes; Water Use; Water demand; Water Consumption.

PRINCIPLE INVESTIGATOR AND AFFILIATION: D. Vallery -

LIAISON OFFICER OR SUPERVISOR: R. C. Hore, Supervisor, Hydrology & Monitoring Section

RESEARCH CATEGORY:

INTERNAL X	*UNSOLICITED CONTRACT* —	*MULTI-YEAR PROJECT* X
GRANT —	*SOLICITED CONTRACT* —	*CONCURRENT PROJECT* —

OBJECTIVE:

To inventory past and present water uses and to project future water demands in the Ontario portion of the International Great Lakes basins.

DESCRIPTION:

In order to formulate long-term water management plans for the International Great Lakes, a joint Canada - United States Study of water uses in the Great Lakes basins is being undertaken. The Ministry of the Environment contribution to this study will be to inventory past and present uses, to develop a methodology for water-demand projections, and to project water demand to the year 2035 for the Ontario portion of the Great Lakes basins.

DURATION OF PROJECT: 2 *YEARS* — *PRESENT YEAR IS* 1 *YEAR* — *REPORTING DATE:* End of 1979

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$20,000	$10,000	1	0.5

SOURCE OF FUNDS:

REGULAR WORK PROGRAM X	*SPECIAL MINISTRY FUNDING* —	*JOINTLY FUNDED PROJECT* —	*OTHER* —

IS A REPORT ANTICIPATED?

Interim report - 1978; final report - 1979.

PARTICIPATION BY OTHER MINISTRIES:

NIL

REMARKS:

Final report to be published by the International Great Lakes Diversion and Consumptive Uses Study Board

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WR-21

BRANCH: Water Resources - Hydrology and Monitoring

DATE: August 23/1978

PROJECT TITLE:

Drainage Basin Inventory Studies

KEY WORDS:

Basin; water-resources inventory; water management; land use planning

PRINCIPLE INVESTIGATOR AND AFFILIATION: K. T. Wang, V. Chin, D. Vallery

LIAISON OFFICER OR SUPERVISOR: U. Sibul, Head, Resource Assessment Group

RESEARCH CATEGORY: *INTERNAL* X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X — *CONCURRENT PROJECT* ——

OBJECTIVE:

To determine the inventory of surface and ground-water resources, both quantity and quality, in drainage basins in Ontario.

DESCRIPTION:

The basin inventories are designed to provide baseline water resources data and interpretation publications for future planning and water resources management in Ontario. The studies are designed to ultimately cover all of the Province on the drainage basin scale. The project involves intensive surface and ground-water data gathering and analysis to determine the integrated water resources in drainage basins. Major water uses and management alternatives are described.

DURATION OF PROJECT: On-going —— *YEARS* *PRESENT YEAR IS* —— *YEAR* *REPORTING DATE* On an average of one every 18 months (see also remarks)

BUDGET:

	TOTAL DOLLARS	*MAN YEARS*
	CURRENT YEAR	*CURRENT YEAR*
	$63,000	2.5

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED?

Every 18 months (approx.) "Water Resources Report" series.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Existing publications are for the following drainage basins: Big Otter Creek; Big Creek; Upper Nottawasaga River; Moira River; Duffins - Rouge; Northern Ontario (in press) and the South Nation (in draft). Work is being completed in the Holland - Black and is commencing in the Humber - Don.

Ministry of the Environment

Ontario

WR-22

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology and Monitoring

DATE: August 23, 1978

PROJECT TITLE:

Water Quality Flagging Procedure

KEY WORDS:

Water Quality; Water quality criteria; Computer program

PRINCIPLE INVESTIGATOR AND AFFILIATION: J. E. O'Neill, Networks Unit

LIAISON OFFICER OR SUPERVISOR: R. D. Terry, Chief, Networks Unit

RESEARCH CATEGORY:

INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X — *CONCURRENT PROJECT* ——

OBJECTIVE:

To develop and operate a computer program that will enable the examination and interpretive reporting of water quality of inland lakes and streams.

DESCRIPTION:

With over 800 water quality stations in the Provincial network, it is difficult to provide water quality interpretations at all locations within a reasonable time. To this end, a computer program will be developed to provide the flexibility of comparing existing water quality either to provincial criteria or (in the absence of specific criteria) to user designated reference levels. The flagging procedure will report on the frequencies (ie. percent of water quality samples) of violation of criteria for different water uses in a given period.

DURATION OF PROJECT: On-going *YEARS* — *PRESENT YEAR IS* —— 1 —— *YEAR* — *REPORTING DATE* Annually

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$30,000	$20,000		0.5

SOURCE OF FUNDS:

REGULAR WORK PROGRAM X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED?

Interim report 1978

PARTICIPATION BY OTHER MINISTRIES:

NIL

REMARKS:

Major computer work is expected to be completed at the end of 1978 with some minor improvements during 1979. This computer program will be available for interpretive reporting in subsequent years.

Ministry of the Environment

Ontario

WR-23

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology and Monitoring

DATE: August 23, 1978

PROJECT TITLE:

Ground - Water Resource of the Grand River Basin.

KEY WORDS:

Grand River; ground water; aquifers; municipal ground-water supply.

PRINCIPLE INVESTIGATOR AND AFFILIATION D. Walmsley, R. Dickin, W. Leipciger.

LIAISON OFFICER OR SUPERVISOR U. Sibul, Head, Resources Assessment Group.

RESEARCH CATEGORY: *INTERNAL* X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X — *CONCURRENT PROJECT* ——

OBJECTIVE:

To inventory the quantity and quality of ground-water resources in th Grand River Basin.

DESCRIPTION:

Ground water is an important resource being used as a domestic and municipal water supply by most communities in the Grand River basin. The project consists of mapping the major aquifers within the basin and the identification of suitable areas for test drilling near existing large communities. The quality of ground water will also be assessed. This study will assist the Grand River Implementation Committee in devising strategies for long-term water resources management and land-use planning.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$150,000	$74,000	7	4

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* —— *SPECIAL MINISTRY FUNDING* X — *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED?

Yes. Part of overall final water-management report.

PARTICIPATION BY OTHER MINISTRIES:

MNR, OMAF

REMARKS:

The Grand River Implementation Committee consists of representatives from the Grand River Conservation Authority, Ministry of Natural Resources and Ministry of the Environment.

Ministry of the Environment

Ontario

WR-24

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology and Monitoring

DATE: August 23, 1978

PROJECT TITLE:

Flowing Wells in Ontario

KEY WORDS: Flowing Wells;Aquifer; hydrogeology

PRINCIPLE INVESTIGATOR AND AFFILIATION: U. Sibul, Head Resource Assessment Group

LIAISON OFFICER OR SUPERVISOR: As above

RESEARCH CATEGORY:

INTERNAL X	*UNSOLICITED CONTRACT* —	*MULTI-YEAR PROJECT* —
GRANT —	*SOLICITED CONTRACT* —	*CONCURRENT PROJECT* —

OBJECTIVE:

To map all flowing wells in Ontario and provide these data to water well drillers and others interested in ground-water development and management.

DESCRIPTION:

The project consists of mapping the locations of all known flowing wells in Ontario, and providing these data (in the form of maps) to all licensed water-well drillers in the Province. The maps are designed to assist water-well drillers in anticipating flowing conditions prior to drilling. With proper well construction, flowing wells can be controlled to avoid unnecessary depletion of ground-water resources and to prevent drainage problems often associated with uncontrolled flowing wells.

DURATION OF PROJECT: 2 1/2 YEARS

PRESENT YEAR IS: 2 YEAR

REPORTING DATE: 1979

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
~~TOTAL PROJECT~~	*CURRENT YEAR*	~~TOTAL PROJECT~~	*CURRENT YEAR*
	$50,000		1/3

SOURCE OF FUNDS:

REGULAR WORK PROGRAM X	*SPECIAL MINISTRY FUNDING* —	*JOINTLY FUNDED PROJECT* —	*OTHER* —

IS A REPORT ANTICIPATED?

Reports in the form of maps are prepared throughout the project.

PARTICIPATION BY OTHER MINISTRIES:

NIL

REMARKS:

Project is essentially complete. All of Ontario has been covered and the relevant maps have been produced. The maps have had limited circulation to water well drillers only. Maps for northern Ontario will be ready for circulation early in 1979.

Ministry of the Environment

Ontario

WR-25

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology and Monitoring

DATE: August 23, 1978

PROJECT TITLE:

Pollution from Land Use Activities Reference Group IJC Task C Studies (PLUARG)

KEY WORDS: IJC, PLUARG; Great Lakes Water Quality; non-point pollution; land use.

PRINCIPLE INVESTIGATOR AND AFFILIATION: R.C. Ostry, Head, Technical Support Unit

LIAISON OFFICER OR SUPERVISOR: R. C. Hore, Supervisor, Hydrology and Monitoring Section

RESEARCH CATEGORY: INTERNAL X — GRANT X — 50% Federal Funding under IJC — UNSOLICITED CONTRACT — — SOLICITED CONTRACT — — MULTI-YEAR PROJECT X — CONCURRENT PROJECT —

OBJECTIVE:

Under Task C of PLUARG, to examine the effects of various land uses and their associated pollutants on Great Lakes water quality. This study primarily deals with non-point pollution sources.

DESCRIPTION:

The role of the Hydrology and Monitoring Section has been to establish and maintain a network of water quantity and quality stations primarily in the Grand and Saugeen rivers and below selected agricultural watersheds to assist in examing the effects of runoff from various land uses including agriculture, urban, extractive industries, transportation and utility corridors, sanitary landfills, sewage sludge and spray irrigation, etc. The results of these studies by the Hydrology and Monitoring Section are contained in five technical reports listed below*. The project was completed in March 1978. A final Task C report to PLUARG delineates the extent of pollutant contribution, the relative significance of sources and practices, the degree of transmission of pollutants to boundary waters and possible remedial measures.

DURATION OF PROJECT: 4 YEARS — PRESENT YEAR IS: 4th YEAR — REPORTING DATE: 1978

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	NIL	NIL		

SOURCE OF FUNDS: REGULAR WORK PROGRAM — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED?

Reports available from IJC office, Windsor.

PARTICIPATION BY OTHER MINISTRIES:

Ontario Ministry of Agriculture & Food; Canada Dept. of Agricultrue; Canada Dept. of Forestry plus contracts to consultants and Universities.

REMARKS:

*(1) Grand River Pilot Watershed Summary Report,
(2) Saugeen River Pilot Watershed Summary Report,
(3) Urban Land Use in the Grand and Saugeen Watersheds,
(4) Rural, Transportation, Extractive and Undisturbed Land Uses in the Grand and Saugeen Watersheds,
(5) Methodology used in the study of land use activities in the Grand and Saugeen Watersheds.

Ministry of the Environment
Ontario

WR-27

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology and Monitoring

DATE: August 23, 1978

PROJECT TITLE:

Mapping of Major Aquifers in Ontario

KEY WORDS:
Aquifers; Hydrogeology; ground-water mapping

PRINCIPLE INVESTIGATOR AND AFFILIATION M. Turner

LIAISON OFFICER OR SUPERVISOR R.C. Ostry, Head, Technical Support Group

RESEARCH CATEGORY: *INTERNAL* X *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To map the location and extent of major aquifers in Ontario.

DESCRIPTION:

The maps are intended to provide basic ground-water data and interpretations of aquifer extents on which large-scale water supply potentials can be approximated. The project involves compiling and analysing ground-water data in order to determine the location and extent of major aquifers in the Province.

DURATION OF PROJECT Temporarily inactive —— *YEARS* *PRESENT YEAR IS* —— *YEAR* *REPORTING DATE* ——

BUDGET:

	TOTAL DOLLARS	MAN YEARS
~~TOTAL PROJECT~~	~~TOTAL PROJECT~~	~~TOTAL PROJECT~~
CURRENT YEAR	$5,000	0.3

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED?
Yes - in form of aquifer maps

PARTICIPATION BY OTHER MINISTRIES:
NIL

REMARKS:

Published maps in this series are the Alliston and the Oak Ridges aquifers; maps of the Guelph-Amabel and the Guelph-Lockport aquifers are in press.

Ministry of the Environment

Ontario

WR-28

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology and Monitoring

DATE: Aug. 23, 1978

PROJECT TITLE:

Evaluation of the Long Term Impact of Pollutants in Ground Water.

KEY WORDS: Ground-water Contamination; Subsurface contaminants

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. G. Hughes, Chief, Ground-Water Protection Unit

LIAISON OFFICER OR SUPERVISOR: As above.

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT X — CONCURRENT PROJECT —

OBJECTIVE:

To examine the long-term impact of contaminants in ground-water flow systems in order to allow for the development of Ministry policies relating to the prevention and clean up of leaks, spills, etc., in hydrogeologically sensitive areas.

DESCRIPTION:

At the present time it is often difficult to quantify the impact of leaks and spills of refined hydrocarbons, the presence of unprotected sand/salt storage facilities, and the occurrence of accidental spills of chemicals, etc., on areal ground-water conditions because of the nature and speed of contaminant movement in the subsurface and the complexities of local hydrogeology. In order to be able to have meaningful policies and guidelines adopted to control the above-mentioned contaminating factors, it is necessary to promote an understanding of the long-term potential of the problem through careful documentation.

DURATION OF PROJECT: Continuing YEARS — PRESENT YEAR IS ——— YEAR — REPORTING DATE: Ongoing

BUDGET:

	TOTAL DOLLARS CURRENT YEAR	MAN YEARS CURRENT YEAR
	$58,000	2 1/2

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Reports are prepared on various projects, project aspects and case histories as work progresses.

PARTICIPATION BY OTHER MINISTRIES:
Involved on MTC Contamination Committees and in liaison with Consumer and Commercial Relations and most hydrogeological consultants outside the MOE.

REMARKS:

Ministry of the Environment

Ontario

WR-29

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology and Monitoring

DATE: August 23, 1978

PROJECT TITLE:

Application of Geophysical Techniques to Ground-Water Studies

KEY WORDS: Ground-water exploration; ground-water contamination; Geophysics, remote sensing, seismic explorations, electrical resistivity

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. E. Rodrigues, Chief, Geotechnical Services Unit

LIAISON OFFICER OR SUPERVISOR: as above

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT X — CONCURRENT PROJECT —

OBJECTIVE:

To enhance the application of geophysical techniques to ground-water supply and contamination studies in order to develop geophysics as an inexpensive method for subsurface hydrogeologic investigations.

DESCRIPTION:

As labour costs escalate, making the installation of test holes and test borings for ground-water exploration and contamination studies uneconomical, the use of geophysical techniques as a means of carrying out subsurface investigations is being increased. It is also anticipated that existing geophysical techniques can be developed to aid in the tracing of contaminant plumes and defining soil attenuating capacities. This work is part of the continuing service function the Geotechnical Services Unit.

DURATION OF PROJECT: Continuing YEARS — PRESENT YEAR IS ——— YEAR — REPORTING DATE: On going

BUDGET:

	TOTAL DOLLARS	MAN YEARS
	~~TOTAL PROJECT~~ / CURRENT YEAR	~~TOTAL PROJECT~~ / CURRENT YEAR
	$48,000	2

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED?

Reports are prepared on various projects and aspects as work progresses

PARTICIPATION BY OTHER MINISTRIES:

Nil

REMARKS:

Service function primarily to Regional Staff; however, requests for assistance from MTC, DOE and universities are answered.

Ministry of the Environment

Ontario

WR-30

RESEARCH AND DEVELOPMENT INVENTORY
1978/1979

BRANCH: Water Resources Branch

DATE: July 31, 1978

PROJECT TITLE:

Mixing and Dispersion of Effluents in Natural Streams

KEY WORDS:
Dispersion, Mixing Zones, Modelling

PRINCIPLE INVESTIGATOR AND AFFILIATION
T. P. Halappa Gowda, Water Modelling Section

LIAISON OFFICER OR SUPERVISOR
F. C. Fleischer

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT X — CONCURRENT PROJECT —

OBJECTIVE: 1. To investigate the effects of outfall and channel hydraulic characteristics on effluent dispersion in shallow streams;
2. To develop relations between mixing zone widths and longitudinal distances, and to estimate mixing zone length using existing relationships;
3. To predict the distribution of conservative and non-conservative materials in the mixing zones under various flow conditions.
4. To develop guidelines and criteria for water quality management in mixing zones.

DESCRIPTION:
Investigations are being carried out on the distribution of ammonia and chlorine residuals in effluent mixing zones in the Grand River. Mathematical expressions for plume width, crossing distance and mixing zone length are being developed. The applicability of the expressions in natural streams of varying morphological and hydraulic characteristics will be examined. The implications of effluent discharge through bank outfalls as well as diffused outfalls will be studied with the help of mathematical models. Based on these investigations, guidelines for water quality management in mixing zones will be developed. The studies are part of an on-going research into mixing phenomena in rivers. A report on chlorine residual despersion has been prepared and several other related reports will be released subsequently.

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS: 3 YEAR — REPORTING DATE: 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
(Grand R.)	$40.0K	$20.0K	2.0	1.0

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING X — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Yes

1978: Prediction of chlorine residual
1979: Mixing and dispersion of effluents; Ammonia toxicity in mixing zones; Grand River Technical Reports

REMARKS:
Work is being conducted partly in support of water quality management programs for the Grand River Basin Water Management Study.

Ministry of the Environment

Ontario

WR-31

RESEARCH AND DEVELOPMENT INVENTORY
1978/79 PROJECTS

BRANCH: Water Resources

DATE: August 16, 1978

PROJECT TITLE: Nanticoke Currents and Chemistry

KEY WORDS: Water Movement, Water Chemistry, Thermal Discharge

PRINCIPLE INVESTIGATOR AND AFFILIATION: J. Polak, Water Modelling Section

LIAISON OFFICER OR SUPERVISOR: M.D. Palmer

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT X — CONCURRENT PROJECT —

OBJECTIVE:

To update the observation of changes in water movement and water chemistry resulting from the thermal discharge from the Ontario Hydro Generating Station, other industrial and urban development in the Nanticoke area.

DESCRIPTION:

Recording current meters are in operation and periodical sampling of water for chemical analysis is continuing.

DURATION OF PROJECT: 12 YEARS — PRESENT YEAR IS 10 YEAR — REPORTING DATE: Annually

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		43,200		1.1 man years

SOURCE OF FUNDS: REGULAR WORK PROGRAM — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT X — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: Natural Resources, Ontario Hydro

REMARKS:

Ministry of the Environment

Ontario

WR-32

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WATER RESOURCES

DATE: July 28, 1978

PROJECT TITLE: Toronto Harbour Study

KEY WORDS: Water Quality, Harbour-lake exchange, modelling, trend analysis

PRINCIPLE INVESTIGATOR AND AFFILIATION: D. Poulton & B. Kohli

LIAISON OFFICER OR SUPERVISOR: M. Palmer

RESEARCH CATEGORY: INTERNAL X — GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT X — CONCURRENT PROJECT ——

OBJECTIVE:

Continued monitoring of Toronto Harbour water quality to assess the non-compliance with IJC objectives and resultant water quality from operating abatement programs. Determine what further abatement programs are required for compliance. Continue work on determining water quality trends particularly for nutrients and phytoplanton. Measure the exchange between the harbour and Lake Ontario.

DESCRIPTION:

Measurement of the micro-scale time variation of water quality and currents, harbour-lake exchange, physical-chemical processes, and biological community abundance, distribution and composition. Numerical modelling of water movements and chemistry.

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS: 2 YEAR — REPORTING DATE: Annually

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$296,000	$118,000	7.3	2.9

SOURCE OF FUNDS: REGULAR WORK PROGRAM —— SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT X — OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

Natural Resources, Harbour Commission, Metro Toronto, City of Toronto

REMARKS: Reports already released:

Water Quality conditions in Toronto Harbour measured by recording chemistry meters 1975-76 (D.J. Poulton)

Toronto Harbour numerical model (D.J. Poulton)

Physical Aspects of Toronto Harbour (B.J. Kohli)

Ministry of the Environment

Ontario

WR-33

RESEARCH AND DEVELOPMENT INVENTORY
1978/79 PROJECTS

BRANCH: WATER RESOURCES

DATE: July 31, 1978

PROJECT TITLE:
HAMILTON HARBOUR STUDY - PHASE III

KEY WORDS: Water Quality, sediment, sediment-water chemistry exchange, harbour-lake exchange, physical-chemical processes, trend analyses, modelling

PRINCIPLE INVESTIGATOR AND AFFILIATION: M. Zarull

LIAISON OFFICER OR SUPERVISOR: M. Palmer

RESEARCH CATEGORY: INTERNAL x — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE: Continued monitoring of Hamilton Harbour water quality to assess the non-compliance with IJC objectives and resultant water quality from operations abatement programs. Determine what further abatement programs are required for compliance. Continue work on determining water quality trends exchange between the harbour and Lake Ontario.
Develop a 3 dimensional circulation model from an existing operational 2 dimensional circulation and dissolved oxygen model in order to better assess the effects of land filling on water quality.

DESCRIPTION:
Measurement of water quality, bottom sediment quality, sediment-water chemistry exchange, harbour-lake exchange, physical-chemical processes and biological community abundance, distribution and composition.

DURATION OF PROJECT: 4 YEARS

PRESENT YEAR IS: 3 YEAR

REPORTING DATE: Annually

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$240,000.	$64,000	9.6	2.4

SOURCE OF FUNDS: REGULAR WORK PROGRAM — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT x — OTHER —

IS A REPORT ANTICIPATED?
yes

PARTICIPATION BY OTHER MINISTRIES:
Natural Resources, Harbour Commission, C.C.I.W.

REMARKS: Hamilton Harbour Study, May 1974, Hamilton Harbour Study 1974, Hamilton Harbour Study, 1975, Hamilton Harbour Study 1976 (in preparation)
The Biological Survey of Hamilton Harbour 1975 (Harris, McMaster)
The Biological Survey of Hamilton Harbour 1976 (Piccinin, McMaster).

Ministry of the Environment
Ontario

WR-34

1978/79

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: July, 1978

PROJECT TITLE:

Great Lakes Water Quality Assessment

KEY WORDS: Great Lakes, water quality, remedial measures, emerging problems, trace contaminants, sediments, fish, IJC

PRINCIPLE INVESTIGATOR AND AFFILIATION: See attached

LIAISON OFFICER OR SUPERVISOR: J. D. Kinkead
Head, Great Lakes Surveys Unit Tel.: 965-6957

RESEARCH CATEGORY: INTERNAL x — GRANT — — UNSOLICITED CONTRACT — — SOLICITED CONTRACT — — MULTI-YEAR PROJECT — — CONCURRENT PROJECT —

OBJECTIVE: To provide the Ministry, the public and the International Joint Commission with continuing information on:

i) water quality conditions in the Ontario portion of the Great Lakes including the identification of areas not meeting Ministry and Water Quality Agreement Objectives;
ii) known and suspected source(s) of degradation and possible remedial action;
iii) effectiveness of remedial measures; and
iv) emergence of new problems (early warning).

DESCRIPTION:

See attached.

DURATION OF PROJECT: on-going YEARS — PRESENT YEAR IS commenced 1965 YEAR — REPORTING DATE: annually

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		1.64 million		66

SOURCE OF FUNDS: REGULAR WORK PROGRAM — — SPECIAL MINISTRY FUNDING — — JOINTLY FUNDED PROJECT x — OTHER —

IS A REPORT ANTICIPATED? Ministry reports by project, input to annual report of Great Lakes Water Quality Board.

PARTICIPATION BY OTHER MINISTRIES: OMNR (Fisheries Branch and Ontario Centre for Remote Sensing), Ministry of Labour (Special Studies and Services Branch)

REMARKS: Program is funded under the Canada-Ontario Agreement Respecting Great Lakes Water Quality.

Ministry of the Environment

Ontario

WR-35

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources Branch

DATE: July 28/78

PROJECT TITLE:

Water Management Systems Analysis

KEY WORDS:
Linear Programming, Screening model, Cost-Benefit

PRINCIPLE INVESTIGATOR AND AFFILIATION: L.A. Logan, Mike Fortin, Water Modelling

LIAISON OFFICER OR SUPERVISOR: F. C. Fleischer, Water Modelling Section

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT X — CONCURRENT PROJECT —

OBJECTIVE:
Framing and evaluation of alternative water management strategies designed to maximize water use for waste assimilation, water supply, flood protection, recreation for the Grand River Basin.

DESCRIPTION:

A linear programming optimization model of the Grand River Basin will be developed and implemented to screen water management strategies. The principles of cost-benefit analysis and multiobjective planning techniques will be used to characterize planning goals and evaluate the contribution of alternative strategies to these goals. Promising strategies identified by the screening model will be subjected to a more detailed evaluation using simulation models.

DURATION OF PROJECT: 2.5 YEARS — PRESENT YEAR IS 1 YEAR — Progress REPORTING DATE: a) March, 1978 b) March, 1979 final Sept./8

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$80.0K	$31.0K	4.0	1.5

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING X — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED?
Reports will be prepared for each stage of the work.

PARTICIPATION BY OTHER MINISTRIES:
Input from Ministry of Natural Resources, Grand River Conservation Authority

REMARKS:

Work is presently being carried out by project contract under the Grand River Basin Water Management Study. Advisory services are being provided by outside consultant (E.A. McBean & Associates) and members of participating agencies.

Ministry of the Environment

Ontario

WR-36

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources Branch

DATE: July 31/78

PROJECT TITLE:

Ecological Modelling for River Management

KEY WORDS:
Stream biology, nutrients, dissolved oxygen, aquatic plants.

PRINCIPLE INVESTIGATOR AND AFFILIATION: D.G. Weatherbe, R. Walker, S. Painter, Water Modelling Section

LIAISON OFFICER OR SUPERVISOR: F. C. Fleischer, Water Modelling Section

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT X — CONCURRENT PROJECT —

OBJECTIVE: 1. Using data collected in S. Ontario rivers, derive growth relationships for nuisance species of attached aquatic plants as functions of environmental factors such as light energy, stream morphometry and nutrient inputs.
2. To formulate a seasonal growth model for plants and their effects on stream nutrients, oxygen and flow for use in development and evaluation of management options.

DESCRIPTION: Field data is being collected on selected study reaches of the Grand River.
Data Include: Upstream and downstream: D.O., temperature, nutrients, sunlight and light extinction ; flow, morphometry, special photosynthesis & respiration. Plant growth relationships will be developed and applied in a seasonal growth model for the entire basin. Models will include the effects of plants on DO and nutrients on a dynamic basis over a growing season. Models will be incorporated into a general water quality model. Management options will be tested and assessed.

DURATION OF PROJECT: 7 YEARS — PRESENT YEAR IS: 6 YEAR — REPORTING DATE: periodic; final report Sept.80

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$270.0K	$70.0K	16.0	3.0

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING X — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED?
Periodic results in Grand River Technical Report Series.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Research is presently part of a comprehensive basin water management study (Grand River) investigating and developing management plans for water quality, water supply, recreation and flood protection; project was originated (1973) as regular Ministry project.

Ministry of the Environment

Ontario

WR-37

RESEARCH AND DEVELOPMENT INVENTORY

1978/79

BRANCH: Water Resources Branch

DATE: July 31, 1978

PROJECT TITLE:

Hydrologic Models in Water Management

KEY WORDS: Hydrology, Streamflow Simulation, Parametric, Stochastic, Runoff, Snowmelt.

PRINCIPLE INVESTIGATOR AND AFFILIATION: L. A. Logan, G. Balachandran, Water Modelling Section

LIAISON OFFICER OR SUPERVISOR: F. C. Fleischer, Water Modelling Section

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT X — CONCURRENT PROJECT —

OBJECTIVE: To implement and apply suitable hydrologic and hydraulic models and stochastic streamflow data generation techniques for use in water quantity and water quality management studies for basins in southern Ontario. Present application in Grand River Basin Water Management Study.

DESCRIPTION: A comprehensive evaluation of three hydrologic models (MOEHYDR2, TVA Square Grid) for use in water management programs in basins of Southern Ontario has been completed. A report is being prepared based on results obtained for the Grand River Basin. As an extension the above study, the NWSRFS hydrologic model will be calibrated and utilized for generation of stream flow data for planning purposes, where historical flow records are insufficient. In addition, stochastic data generation techniques and statistical data analysis methods are being tested for input to dynamic waste assimilatic models, urban and agricultral runoff studies and evaluation of surface and groundwater supplies. The application of a hydraulic model HEC-5C will be implemented for use in problems involving reservoir operations.

DURATION OF PROJECT: 4 YEARS (Grand River) — PRESENT YEAR IS: 3 YEAR — REPORTING DATE: periodic

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
(Grand River)	$110.00	$55.0	6.0	2.5

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING X — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED?

Periodic technical papers and reports showing results of applications.

PARTICIPATION BY OTHER MINISTRIES:

Grand River Project: Ministry of Natural Resources, Grand River Conservation Authority.

REMARKS: Present work is being conducted as part of an inter-disciplinary projec (Grand River Basin Water Management Study), to develop total quantity and qulity management plan for the basin. Project terminates Sept. 1980.

Ministry of the Environment

Ontario

WR-38

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources Branch

DATE: August 4/78

PROJECT TITLE:

Integrated Water Quality Modelling for River Systems

KEY WORDS:

Water Quality, Dynamic Modelling, Rivers

PRINCIPLE INVESTIGATOR AND AFFILIATION: D.G. Weatherbe, A. Kwong, Water Modelling Section

LIAISON OFFICER OR SUPERVISOR: F.C. Fleischer, Water Modelling Section

RESEARCH CATEGORY: INTERNAL X | GRANT — | UNSOLICITED CONTRACT — | SOLICITED CONTRACT — | MULTI-YEAR PROJECT X | CONCURRENT PROJECT —

OBJECTIVE:

-Develop a dynamic systems model applicable for water quality simulation for the Grand River and major tributaries.
-Apply the dynamic systems model for assessment of various water quality management alternatives.

DESCRIPTION:

Major activities of water quality modelling include:

1. Model modifications to an existing model (Thames River Model)
2. Field work for data collection
3. Input data preparation based on field data collection
4. Model calibration
8. Test management alternatives (79/80)

Model is to account for effect in water quality of: STP effluent, stream plant and algae, urban storm water runoff, agricultural runoff and variations in flow and stream temperature.

DURATION OF PROJECT: 2.5 YEARS | PRESENT YEAR IS 1 YEAR | REPORTING DATE: March 1979, Sept. 1980 (final)

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	85.0K	$35.0K	5.5	2.5

SOURCE OF FUNDS: REGULAR WORK PROGRAM X | SPECIAL MINISTRY FUNDING X | JOINTLY FUNDED PROJECT — | OTHER —

IS A REPORT ANTICIPATED?

Grand River Technical Report March 1979, final study report Sept. 1980

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Project is part of Grand River Basin Water Management Study designed to develop total water management plan for basin.

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Prepared for the

Review Board
Canada/Ontario Agreement
January 1978

PROJECT TITLE: Thunder Bay

BACKGROUND: Studies carried out by the Ministry in 1973 and 1974 identified a number of problems in Thunder Bay associated with industrial and municipal discharges. These included bacterial contamination, oxygen depletion, nutrient enrichment and mercury accumulation in fish and sediments. A survey of the area in 1977 indicated similar water quality conditions.

The City of Thunder Bay has completed a new primary sewage treatment plant and interceptor sewer. The new plant replaces two plants and the interceptor corrects problems of discharge of untreated combined flows which existed in some areas. Included in these are domestic and industrial wastes from Canada Malting Company and Industrial Grain Products Ltd.

The Ministry issued a control order to Abitibi Paper on November 24, 1977 requiring the company to improve treatment at the three Thunder Bay mills. The process conversion by Great Lakes Paper Company to a closed system is partially completed. This industry is under ministerial requirement and direction to complete the system by March 1, 1978.

OBJECTIVES: Determine the effectiveness of these abatement measures in correcting water quality problems.

Maintain surveillance of nutrient trends in the harbour.

Assess levels of mercury in important commercial and sport fish species in relation to human health guidelines.

SCOPE: The program will utilize the Thunder Bay grid of 50 stations along 10 transects established in 1977. This grid will be sampled 5 times during August. Emphasis will be placed on nutrient and bacterial parameters. In addition, oxygen profiles will be taken of the inner harbour to assess the areal extent of

depletion. Also, samples will be taken in pulp mill effluent plumes and analysed for organic substances implicated in fish tainting. Fish collection and analysis will be undertaken in co-operation with the Ministry of Natural Resources.

OUTPUT: Report to regional staff, industry and general public on progress in correcting water quality problems. Final report expected spring 1979.

MANPOWER: Regular: 1.3 MY
Casual : 0.4 MY

BUDGET: $50,000

PRINCIPAL INVESTIGATOR: Nick Herzog (5-6957)

PROJECT TITLE: Jackfish Bay

BACKGROUND: Jackfish Bay serves as the receiving body for pulp and paper wastes originating from the Kimberly-Clark of Canada Ltd. kraft mill at Terrace Bay. These wastes enter Jackfish Bay via Blackbird Creek. Previous studies have indicated water quality impairment due to phenolic substances and bacterial contamination. Accumulations of mercury were found in fish and sediments. Disruption of the benthic community in the vicinity of the outfall has resulted from discharges of toxic wastes.

In conjunction with a significant expansion of the existing mill completed in 1977, Kimberly-Clark has instituted a number of abatement measures. Included are clarifiers for suspended solids removal and condensate stripping to eliminate toxic components. Using conventional technology, this industry has reduced water consumption and waste loadings per ton of product produced. However, since production by the new facility will be about twice the former output, increases in BOD and suspended solids loading can be expected. The new mill has been designed to provide the capability of conversion to the Rapson process.

OBJECTIVE: Compliance monitoring in terms of water quality changes following mill expansion.

SCOPE: Field studies in the western arm of Jackfish Bay (Moberly Bay) will consist of a short-duration survey (4 days). Analyses will include a wide range of water quality parameters to delineate the areal extent of wastes in the receiving waters.

OUTPUT: Report to region preliminary findings of water quality conditions. Final report expected spring 1979.

MANPOWER: Regular: 0.6 MY
Casual : 0.2 MY

BUDGET: $25,000

PRINCIPAL INVESTIGATOR: Nick Herzog (5-6957)

LAKE HURON

PROJECT TITLE: St. Marys River

BACKGROUND: Although water quality conditions have generally improved in the river, levels of phenolic compounds, cyanide, heavy metals and bacteria are still of concern. Major abatement programs at Algoma Steel Corporation and Abitibi Paper Company are now complete. Significant improvement in water quality of the river is expected in 1978.

OBJECTIVES: To assess the adequacy of abatement measures completed in 1977 and the need for additional remedial programs.

Utilize current data in defining trends in water quality conditions and provide information relevant to compliance with Ministry criteria and Water Quality Agreement objectives.

To estimate the transport of phosphorus and other contaminants to Lake Huron.

SCOPE: Field studies will be undertaken along the Ontario shoreline of the lower river downstream from Algoma Steel and municipal discharges during six cruises on monthly intervals from early May to October. Analysis will focus on heavy metals, phenols, cyanide and bacterial parameters. Effluent bioassays will be conducted at Algoma Steel under a separate program.

OUTPUT: A progress report containing water quality conditions after completion of remedial programs will be prepared and further recommendations for abatement developed as necessary by March 1979.

Manpower: Regular: 3.1 MY
Casual : 0.7 MY

BUDGET: $65,500

PRINCIPAL INVESTIGATOR: Nick Herzog (5-6957)

PROJECT TITLE: Serpent Harbour

BACKGROUND: During previous studies in 1975 and 1977, the issue of acidification of harbour waters was noted. The problem of acidification is a result of upstream mine tailings areas in combination with the naturally low abundance of geochemically derived carbonates in the drainage basin. Past information indicates that the acidification problem is most dramatic demonstrated during spring after snowmelt runoff and generally extends throughout Serpent Harbour up to 4 km from the river mouth. In light of recent announcements regarding proposed mine expansions in the Elliot Lake area, and the environmental review process currently being undertaken by the Environmental Assessment Board, the following study is being undertaken.

OBJECTIVES: Determine the extent of acidification of Serpent Harbour waters as a result of upstream sources.

SCOPE: Concurrent with the monitoring for radioactivity in water as outlined under the radioactivity and waste heat monitoring program, conventional water quality sampling will be undertaken. Sampling will focus on determinations of pH, alkalinity, nitrogens and sulphate in harbour waters. Two cruises are planned for the 1978 field year one after spring ice break up and one in late summer/early fall. The station grid includes 20 stations located up to 10 km from the source.

OUTPUT: A progess report containing water quality conditions after completion of remedial programs will be prepared and further recommendations for abatement developed as necessary by March 1979.

MANPOWER: Regular: 0.7 MY
Casual : 0.1 MY

BUDGET: $29,500

PRINCIPAL INVESTIGATOR: Ian Ross (5-6957)

PROJECT TITLE:	Penetang-Midland
BACKGROUND:	Previous investigations by the Ministry indicated significant enrichment problems in Penetang-Midland Bay. Remedial measures have been undertaken including phosphorus removal facilities at the four local sewage treatment plants. Improvements are expected to occur over a long term due to the restrictive nature of the bays which hinders mixing with Georgian Bay waters.
OBJECTIVES:	Assess rate and degree of improvement in bay water quality and phytoplankton identified and enumerated.
SCOPE:	Sampling will be undertaken biweekly throughout the ice-free portion of the year. Based on assessments of past water quality data, an efficient grid of 10 stations will be sampled for a variety of nutrient enrichment parameters, including detailed phytoplankton enumerations.
OUTPUT:	Summary report to Regional staff and Head Office.
MANPOWER:	Regular: 0.7 MY Casual: 0.2 MY
BUDGET:	$22,000
PRINCIPAL INVESTIGATOR:	Ken Nicholls (8-3058)

PROJECT TITLE: St. Clair River

BACKGROUND:

Significant reductions in levels of chloride, total dissolved solids and mercury in fish and sediment have occurred in the river . An increase in nitrate levels throughout the river has been observed in recent years.

Improved treatment at Polysar, Dow Chemical of Canada Ltd. and Imperial Oil Enterprises are currently underway.

Investigations of the impact of dissolved organics on water supplies and studies on fish tainting problem will be continued under a separate program being run by Southwestern Region, MOE.

In accordance with the U.S.-Canada Water Quality Agreement, an international surveillance plan has been defined for the St. Clair River. This nine-year plan provides the framework for planning and co-ordinating the surveillance activities of both countries.

OBJECTIVES:

Assess the effectiveness of remedial programs and identify emerging problems.

Maintain surveillance of mercury levels in sediments of the St. Clair system (further details see Contaminants in Fish Program).

Estimate the transport of phosphorus and other contaminants out of Lake Huron.

SCOPE:

Field studies will be carried out during June, July, August and November. Samples will be analysed for nutrients, solids, and chlorides. Established river transects at head and mouth ranges, and below point sources will be sampled.

Bi-annual sampling for mercury in sediment will take place at six transects along the river, two stations in Chenal Ecarte and four stations in the Canadian sector of Lake St. Clair.

OUTPUT:	Study findings and recommendations to be forwarded to the Surveillance Subcommittee and to the Southwestern Region. Annual reporting of mercury trends in sediments will continue.
MANPOWER:	Regular: 3.1 MY Casual : 0.7 MY
BUDGET:	$83,000
PRINCIPAL INVESTIGATOR:	Yousey Hamdy (5-6957)

PROJECT TITLE: Detroit River

BACKGROUND: A study is currently being undertaken to assess the areal variation of total phosphorus loading estimates at the Detroit River mouth. Based on statistical methods developed by the IJC Regional Office, MOE and MDNR, the variance of loading estimate within a cruise and within a year are being estimated.

Current water quality investigations in the river have revealed improvement in bacteria levels along the Ontario shoreline of the river as well as identifying further sources of bacterial contamination along the Windsor and Amherstburg shorelines. Remedial actions to correct these problems are being pursued by MOE with the municipalities.

As part of the proposed international Lake Erie surveillance plan, intensive monitoring of the river will be undertaken during 1978 and 1979 in co-operation with the Michigan Department of Natural Resources.

OBJECTIVES: Maintain surveillance of public health indicator bacteria along the Ontario shoreline of the river.

Assess the Lake Erie response to phosphorus reductions by accurately estimating total phosphorus loading at the Detroit River mouth.

SCOPE: In the first year of the international surveillance plan, water quality monitoring of the river will include nutrient, solids and public health indicators. Data generated will supplement the Michigan DNR who have the lead role. Assessment of total phosphorus loading estimates at the river mouth will continue. Three cruises are planned which include head and mouth transects as well as transects located downstream of known point sources adjacent to Windsor and Amherstburg.

OUTPUT: A summary report with recommendations for estimating loads of nutrients applicable for all the connecting channels will be prepared. Status report to the Michigan-DNR, IJC Regional Office and Southwestern Region.

MANPOWER: Regular: 3.1 MY
Casual : 0.7 MY

BUDGET: $83,000

PROJECT TITLE:	Wheatley Harbour
BACKGROUND:	Studies carried out in 1973 identified a number of problems associated with discharges from Omstead Foods Ltd. These included dissolved oxygen depletion and bacterial contamination. Expansion of treatment facilities was scheduled for completion during 1977.
OBJECTIVES:	Determine the efficiency of remedial measures undertaken by Omstead.
SCOPE:	During September water samples for chemical and bacteriological analysis will be collected from the harbour and adjacent Lake Erie. A sampling grid of 32 stations located both inside and outside the harbour has been established for 1978.
OUTPUT:	Report on progress of remedial measures in terms of their impact on the harbour water quality. Findings and recommendations to be forwarded to Regional staff and industry.
MANPOWER:	Regular: 0.6 MY Casual : 0.2 MY
BUDGET:	$17,500
PRINCIPAL INVESTIGATOR:	Yousey Hamdy (5-6957)

PROJECT TITLE: Nearshore Lake Erie

BACKGROUND:

Improvements in water quality of nearshore Lake Erie have been observed in recent years. Total phosphorus levels have declined in Western Lake Erie, phytoplankton biomass decreased at the Kingsville water intake, and total chlorophyll a showed a marked improvement, however, still remained in the eutrophic range. Also, mercury levels in fish declined significantly and concentrations in some fish species approached the federal guideline for safe human consumption.

In eastern Lake Erie, conditions have not been changed significantly; however, an apparent decrease in total phosphorus levels in some parts of the basin have been recently observed. The Grand River mouth is still characterized by high nutrient and total dissolved solids levels.

A draft international surveillance plan has been prepared for Lake Erie by the Lake Erie work group of the Surveillance Subcommittee (IJC). This plan is currently under review by the jurisdictions involved. The plan calls for intensive surveillance activity to occur during 1978-79 with a detailed "state of the lake" assessment report to be completed by 1981. The design of the nearshore component of this plan has evolved in large from MOE's past experience in conducting coastal studies in the lake, with primary emphasis on a strategy designed for problem area delineation, and detection of spatial and temporal water quality trends.

OBJECTIVES:

Maintain surveillance of the impact of Haldimand and Norfolk area development and provide input to the long term fish study being undertaken by MNR.

Assess local and whole lake response to abatement measures and to identify emerging problems.

Define the response of phytoplankton growth to nutrient distribution in Western Lake Erie. Provide input to the Grand River basin management study in the area of nutrient controls.

SCOPE:	Field studies will be carried out during spring, summer and fall. Each cruise will include sampling for nutrients, biomass indicators, public health indicators, dissolved oxygen and solids through 3-4 consecutive day cruises. Tri-weekly sampling will be conducted at Nanticoke and will include phytoplankton biomass measurements. Depth sampling for nutrient and chlorophyll a will be attempted at the Grand River mouth area and the Western Basin of Lake Erie. Station locations along inshore/offshore transects adjacent to intakes, point sources, and tributary mouths have been incorporated into the design.
OUTPUT:	Status report to the surveillance Subcommittee (IJC), internal reporting to regional and head office staff. Detailed "state of the lake" water quality assessment to be prepared by 1981.
MANPOWER:	Regular: 9.0 MY Casual : 2.0 MY
BUDGET:	$227,500
PRINCIPAL INVESTIGATORS:	Yousey Hamdy (5-6957) Merv Palmer (5-4590)

PROJECT TITLE: Bay of Quinte

BACKGROUND: Most water users in the Bay are being adversely affected by nutrient enrichment. There have been occasions where little or no dissolved oxygen was present in the deep waters of the Bay. Bacterial contamination resulting from inadequate municipal treatment facilities has restricted recreational activities in some areas. A number of steps have been taken in improving municipal treatment facilities. Trenton and Picton have completed plant expansions. Belleville is planning to expand facilities in the near future. An expansion at Napanee is under construction. Treatment at Deseronto will include phosphorus removal in 1978.

OBJECTIVE: Monitor the changes in water chemistry and phytoplankton in the Bay of Quinte as phosphorus reductions at sewage treatment plants come online. Assess progress in correcting poor bacteriological conditions.

SCOPE: This is a co-operative study with Fisheries and Environment Canada, Ministry of Natural Resources, universities of Guelph and Queen's. Virtually all aspects of the limnology of the Bay of Quinte are under study. Public health indicators will be sampled during three cruises in the vicinity of municipal discharges.

OUTPUT: Annual reports are published incorporating material from all study team members. The data for the next two years should be particularly important since phosphorus reductions are now in effect at all major plants.

MANPOWER: Regular: 2.0 MY
Casual : 0.4 MY

BUDGET: $49,500

PRINCIPAL INVESTIGATOR: Ken Nicholls (8-3058)

PROJECT TITLE: Toronto Harbour

BACKGROUND: Toronto Harbour is a highly eutrophic body of water receiving inputs from the Don River and city storm and combined overflow sewers. The bacteriological water quality in the Inner Harbour is poor and may be restrictive to recreational uses. Detailed studies conducted in 1976 and 1977 delineated the extent of this impairment and in addition identified a potential problem of heavy metal, oil and PCB contamination. A mid-town interceptor sewer has been completed and will be operational in early 1978. As well, a new sewer system will be completed in 1978 to replace the septic systems on the Toronto Island Park. These remedial measures may improve water quality in the Inner Harbour.

OBJECTIVES: Assess effectiveness of remedial measures on water quality in the harbour.

Identify discharges entering the harbour and map out zones of influence under various meteorological conditions through water quality, sediments and zoobenthos analysis.

Investigate the interaction of waters outside the Toronto Harbour with those inside the harbour.

SCOPE: Three cruises will be carried out in the Inner and Outer Toronto harbours and adjacent areas.

Biweekly sampling at designated locations and major discharges will include operation of continuous recording water quality and current meters.

Two water quality surveys and one sediment survey of the Toronto Island Lagoons and channels will be carried out.

A specific sewer outfall within Toronto Harbour will be intensively sampled during three selected periods of the year.

Analyses will include nutrients, public health bacterial parameters, biomas indicator, heavy metals and polyaromatic hydrocarbons.

A numerical model will be used to predict the effect of shoreline alteration and waste discharge reductions on harbour water quality, particularly dissolved oxygen and total dissolved solids. Mass exchange rates will be estimated from current meter data.

OUTPUT: This study is done with co-operation of the Central Region, City Public Works Department, Metro Works Department, City Public Health Department, Toronto Harbour Commissioners, Ontario Hydro and MTRCA. The output will consist of (i) Ministry reports prepared by mid-1979 including findings and recommendations to be forwarded to regional abatement staff and other involved agencies and, (ii) updated information for the report entitled "Water" prepared by this Ministry's staff for Central Waterfront Planning Committee in 1976.

MANPOWER: Regular: 7.6 MY
Casual : 1.9 MY

BUDGET: $204,000

PRINCIPAL INVESTIGATORS: Marta Griffiths (5-6957)
Merv Palmer (5-4590)

PROJECT TITLE: Hamilton Harbour

BACKGROUND: An intensive study of Hamilton Harbour in the previous years identified a number of problems associated with present and past industrial and municipal discharges into the harbour. In particular, during the summer months, the hypolimnetic waters become depleted of oxygen, the sediments in the harbour are contaminated by metals and nutrients which can cause continuous pollution even with curtailment of the new sources. The oxygen depletion process (and consequent degrading of the water quality) was partially offset by artificial mixing project conducted by the Ministry of the Environment during the summer months of 1975, 1976 and 1977, with some local improvement also due to the vortex mixing conducted by the McMaster University in 1977.

OBJECTIVES: Determine status and changes in water quality and ecology of the harbour. Find the long term effects of the artificial mixing. Improve the quality of oxygen and other material balances and deepen the knowledge of the processes involved in the harbour cycles. Study the major outfalls.

SCOPE: Continuation of the weekly sampling at four locations with detailed monthly survey. Continuation of work on the three-dimensional numerical model. The model will be used for assessment of trends and effects of landfilling operations, dredging, etc.

Three cruises of Hamilton Harbour will be carried out to analyze areal extent with some depth profiling of bacteriological and chemical parameters.

OUTPUT: Ministry reports including findings and recommendations to be forwarded to regional abatement staff and other involved agencies. Also a report by December 1979 summarizing all data and findings gathered since the study began in 1973.

MANPOWER: Regular: 3.7 MY
Casual : 0.7 MY

BUDGET: $101,000

PRINCIPAL INVESTIGATOR: Merv Palme(5-4590)

PROJECT TITLE: Lake Ontario

BACKGROUND: Previous studies have indicated that nutrient levels in the nearshore zone of Lake Ontario are sufficiently high to induce localized phytoplankton blooms and prolific Cladophora growth where suitable substrate exists. Elevated levels of trace contaminants such as PCB's, Mirex, DDT and some heavy metals have been detected in the lake biota and sediments. Landfill sites are increasing in number in Lake Ontario and, while designed to meet recreational demands and construction industry excavation disposal needs, are potential problem areas with respect to high bacterial levels, nutrients and elevated concentrations of trace contaminants in new embayments, new sediment sources, new erosion patterns and conflict with water intakes and dispersion at sewage treatment plant outfalls.

OBJECTIVES: Assess the water quality of the nearshore zone of Lake Ontario in relation to progress in reducing phosphorus inputs.

Identify sources of the trace contaminants discharged to the lake and determine the zone of influence associated with each identified source.

Provide a continuing data comparison to aid in early detection of emerging problem areas.

Assess and provide guidance for MTRCA in self-monitoring of landfill operations and development of environmentally sound site designs and filling procedures.

SCOPE: Two cruises will be undertaken in 1978 (spring and summer) in the nearshore zone between the Niagara River and Cobourg. A system of transects extending from the shore to a 50 m depth contour will be monitored for nutrients and associated water quality parameters. Water quality and sediments will be studied in Whitby and Port Credit harbours to assess status following recent dredging activities and to assess potential water quality problems due to increasing

recreational development. In addition, a potential problem area investigated in detail will be Oshawa Harbour and Second Marsh, where new port and recreational development is contemplated and where a sewage treatment outfall is located on the shoreline. Water quality sediment and benthos will be studied in this area.

OUTPUT: Information from these investigations will be used to update the problem area and general assessments of Lake Ontario in the 1978 Water Quality Board report. Reports on Whitby, Port Credit, and Oshawa will be prepared in 1979 with preliminary findings and recommendations forwarded to regional staff.

MANPOWER: Regular: 4.8 MY
Casual : 1.0 MY

BUDGET: $115,000

PRINCIPAL INVESTIGATOR: Wayne Richardson (5-6957)

PROJECT TITLE: Radioactivity and Waste Heat Monitoring

BACKGROUND: Previous monitoring of waterborne radionuclide levels in Serpent Harbour and Port Hope has indicated that ^{226}Ra levels periodically approach or exceed the Ministry criterion for public water supply. The IJC has requested upgraded surveillance at these and other locations where radioactive releases exist. There is also a need for better understanding of thermal plume characteristics at nuclear generating stations. The use of airborne thermal infrared scanning has proven to be a good efficient tool in managing this task.

OBJECTIVES: Maintain surveillance of waterborne radionuclide levels off the mouth of the Serpent River and in the vicinity of waste heat discharges from the Douglas Point, Bruce "A", and Pickering generating stations. Map waterborne waste heat plumes off the Bruce "A", Douglas Point and Pickering generating station discharges.

SCOPE: Radioactivity sampling will encompass sampling grids within the "source control areas" of the Bruce "A", Douglas Point and Pickering generating stations discharges; and at the mouth of Serpent River. Quarterly sampling will be undertaken for the Bruce "A", Douglas Point and Pickering G.S. discharges and two surveys are planned for Serpent Harbour.

Thermal plume mapping will involve the Bruce A, Douglas Point and Pickering generating stations. Airborne remote sensing services will likely be contracted to the Canada Centre for Remote Sensing. Frequency of coverage will involve a minimum of three flights/site during the fiscal year.

OUTPUT: Radioactivity surveillance data will be evaluated with reports being circulated to Head Office and Regional staff as well as providing input to the Annual Report of Radioactivity Subcommittee of IJC. Thermal plume maps will be provided and circulated to Head Office and Regional staff for review.

MANPOWER: Regular: 1.2 MY
Casual : 0.2 MY

BUDGET: $40,000

PRINCIPAL INVESTIGATOR: Ian Ross (5-6957)

PROJECT TITLE: Remote Sensing

BACKGROUND: The utility and benefits of remote sensing data has been proven in a variety of cases in particular, the use of infrared scanning techniques for mapping waterborne thermal plumes from nuclear and fossil fueled power generation plants. A great potential for the use of remote sensing data for surveillance planning and the dimensional analysis of a variety of plume types has also been demonstrated by recent work and information reported in the literature.

OBJECTIVES: 1) Development of remote sensing techniques applicable to surveillance planning. In particular the dimensional analysis of pulp and paper mill plumes, thermal plumes and the mapping and delineation of Cladophora.
2. Development of digital remote sensing data analysis techniques.

SCOPE: This project will involve thermal plume mapping of selected cooling water discharge to the Great Lakes including the Douglas Point, Bruce "A" and Pickering G.S. discharges (see Radioactivity and Waste Heat Monitoring). Additional work using digital Landsat I and II computer compatible tapes is planned. Computer compatible tapes of low altitude thermal infrared line scanner data from previous thermal plume mapping studies will also be analysed. Further development of a proposal for nearshore Cladophora monitoring in the Great Lakes using multi-spectral photography is also proposed.

OUTPUT: A proposal and techniques manual for Cladophora monitoring will be drafted under contract to the Ontario Centre for Remote Sensing, OMNR. Internal reports and maps will be prepared on an ongoing basis for evaluation by Regional and Head Office staff.

MANPOWER: Regular: 0.7 MY
Casual : - MY

BUDGET: $12,000

PRINCIPAL INVESTIGATOR: Ian Ross (5-6957)

PROJECT TITLE: Water Intake Program

BACKGROUND: Water intake sampling for nutrients and minerals started in 1976. This program provides the possibility of year long sample collections by eliminating problems associated with winter field conditions. Continuation of this program will help establish long term trends for water quality conditions in the Great Lakes water chemistry data together with the ongoing phytoplankton biomass monitoring program are valuable in evaluating water quality assessment from other projects.

The portion of the nearshore which is represented by the intake should be defined to facilitate a reliable interpretation of data generated from the water intake program.

OBJECTIVES: Measure seasonal and year-to-year changes in phytoplankton and water chemistry in nearshore areas of the Great Lakes.

Assess relation of water intake data to the quality of nearshore waters of the Great Lakes.

SCOPE: Sampling of the 14 intakes in Lake Huron, Lake Erie and Lake Ontario will continue. Mineral and nutrient chemistry together with phytoplankton will be sampled weekly in co-operation with treatment plant personnel.

In addition, a system of transects coincident with water intake locations in Lake Huron, Lake Erie and Lake Ontario will be sampled during spring and summer through 3-5 consecutive days per cruise. These transects extend 4-5 km from shore and stations will be aligned on each transect based on bathymetry at each water intake location. Depth sampling for nutrients and minerals will be undertaken concurrently with nearshore monitoring programs.

OUTPUT: The data are summarized annually; with significant findings reported and/or published in scientific journals. Temporal trends will be evaluated in 1981.

MANPOWER: Regular: 2.7 MY
Casual : 0.4 MY

BUDGET: $69,500

PRINCIPAL INVESTIGATOR: Ken Nicholls (8-3058)

PROJECT TITLE: Contaminants in Fish

BACKGROUND: The analysis by the Ministry and by other agencies of fish taken from Great Lakes waters has shown many instances of unacceptable accumulations of contaminants such as mercury, PCB and Mirex. These discoveries have led to restrictions on commercial fishing and warnings on human consumption in a number of areas.

The sources of some contaminants and the mechanism of uptake by fish are only partially understood.

OBJECTIVES: Maintain surveillance of contaminants such as mercury, PCB and Mirex shown to have accumulated to unacceptable levels in important sport and commercial fish species.

Locate areas, and specific sources (where possible) of continuing input of trace contaminants through assessing levels in resident fish species.

SCOPE: Edible-portion samples of important fish species including lake trout, walleye, bass, perch, smelt, etc. will be analyzed for contaminants of public health and wildlife concern. Sampling sites will include those areas shown to have high contaminant levels.

Young-of-the-year fish will be used to aid in determining on-going contamination, sources, and possible changes due to remedial work or increased contaminant loadings.

In addition to satisfying the Province's own needs, the program has been developed to provide input to the International Fish Contaminant Surveillance Program and complements the open lake programs of the Department of Fisheries and the Environment.

The collection and analyses of fish and the interpretation and reporting of data are carried out in co-operation with the ministries of Natural Resources and Health.

Planned investigations of trace contaminants in water, sediments and other biota have been described on a site by site basis elsewhere.

OUTPUT: Contaminant data on the edible portion is routinely reviewed and released in consultation with the ministries of Natural Resources and Health. Annual summaries are prepared and a separate report will be prepared on the source-identification work and the more significant findings submitted to scientific journals.

MANPOWER:
Regular: 2.3 MY
Casual : 0.6 MY

BUDGET: $76,000

PRINCIPAL INVESTIGATOR: Karl Suns (8-3011)

PROJECT TITLE:	Completion of Reports
OBJECTIVES:	Complete outstanding reports on field investigations undertaken in 1976 and 1977.
SCOPE:	Reports include: Toronto Harbour Lake Ontario Nearshore Western Basin of Lake Erie Eastern Basin of lake Erie Grand River Mouth Thunder Bay St. Marys River McGregor Bay
OUTPUT:	Reports will be internal or published documents with findings incorporated into Ministry input to the IJC.
MANPOWER:	Regular: 3.5 MY Casual : 0.7 MY
BUDGET:	$85,000

PROJECT TITLE:	Canada-U.S. Water Quality Agreement - Water Quality Board Report
OBJECTIVE:	Under terms of the Canada-Ontario Agreement, the Ministry is required to report annually to the IJC on the findings of its surveillance activities and to participate in the development and operation of a co-ordinated international surveillance plan. The objective of this activity is to fulfill our commitment under the COA Agreement.
SCOPE:	Assess and comment on progress or lack of progress in resolving "problem areas".,
	Provide details of areal extent, degree and duration of any water quality impairment exceeding the Agreement objectives.
	Chair or participate in working groups involving other agencies in the preparation of overall assessment of water quality conditions in each of the Great Lakes.
	Chair or participate in working groups involving other agencies in the development of the international surveillance plan.
	Co-ordinate input from other staff involved in the Great Lakes program for incorporation in submissions to the IJC.
OUTPUT:	Completion of the Water Quality Board Annual Report including presentation of the Ministry's progress in meeting objectives spelled out in the Agreement. Miscellaneous reports will also be published under IJC cover.
MANPOWER:	Regular: 2.8 MY Casual : 0.5 MY
BUDGET:	$69,000

PROJECT TITLE: Committees

OBJECTIVES: Provide Branch and Ministry input to numerous committees involved in the planning or reporting of surveillance and assessment activities or the establishment of water quality objectives for the Great Lakes.

SCOPE: Major committee involvements project for the year include:

-Surveillance Subcommittee (IJC)
-Surveillance Committee (COA)
-Water Quality Objectives Subcommittee (IJC)
-Radioactivity Subcommittee (IJC)
-Nanticoke Environmental Committee (NEC)

OUTPUT: The incorporation of Ministry policy and ideas into the overall management of the Great Lakes and increased recognition of the Ministry's role in surveillance and water quality management.

MANPOWER: Regular: 1.1 MY Casual: 0.2 MY

BUDGET: $40,000

PROJECT TITLE: Requests for Information

OBJECTIVE: Satisfy information requests from the public, the media, industry, regional staff, other ministries and other jurisdictions pertaining to local or lakewide water quality conditions, sources of pollution and ongoing abatement programs.

SCOPE: Literature searches, examination of ministry files, evaluation of data records, and field investigations are carried out as required when a request is received.

OUTPUT: Improved awareness of Great Lakes water quality and what is being done by Ontario to improve and maintain it.

MANPOWER: Regular: 1.5 MY
Casual : 0.2 MY

BUDGET: $17,000

PROJECT TITLE: Data Quality

BACKGROUND: Water quality surveillance in the Great Lakes under the terms of the 1972 Great Lakes Water Quality Agreement involves many governmental and institutional laboratories. The need for reporting water quality data that is accurate and precise is self-explanatory as is the need for information that is generally compatible on a whole lake, interlake or basin basis. To meet this need at the international level, the Data Quality Work Group of the Surveillance Subcommittee was formed in 1972 with representation from the two federal governments and member provincial and state agencies.

OBJECTIVES: To provide technical input to the Data Quality Work Group per the established terms of reference of that Work Group as outlined below.

SCOPE: The activities of the Work Group involve quality control assurance programs at an international level that go beyond the needs of internal inter-lab quality control programs currently implemented within MOE central and regional laboratories. The terms of reference for the Work Group are sufficiently broad and encompass a variety of surveillance oriented tasks including:

1) Develop a Quality Assurance Statement of a broad and general nature to encompass the elements of the Quality Assurance program.
2) Develop and implement methods for conducting inter-laboratory comparisons and evaluating their results.
3) Define the intra-laboratory quality control program required for support of the Surveillance Program and monitor laboratory compliance.
4) Document and evaluate the suitability of various procedures used by each laboratory for each test and provide full information on the analytical characteristics.
5) Develop field sampling and handling protocols.

OUTPUT:	Input to the Annual Report of the Surveillance Subcommittee, IJC and to the lake by lake surveillance plans being prepared by lake work groups.
MANPOWER:	Representation by MOE on this Work Group presently involves scientific and technical staff from the Laboratory Services Branch. Manpower allocations are included within the other projects outlined in this project summary.
BUDGET:	Incorporated in individual projects and under committees.

PROJECT TITLE: Data Management and Interpretation

BACKGROUND: The most important component of any water quality surveillance program is the assessment and reporting of monitoring data for it is here that the real benefits for water resources management are realized. Management of Great Lakes water quality due to its international and multi-institutional nature requires assessments that are generally compatible on a whole lake, interlake or basin basis. More recently, the Surveillance Subcommittee has drafted international surveillance plans for lakes Ontario and Erie which currently require the development of data management and interpretation strategies. With respect to the foregoing need, the Surveillance Subcommittee is currently developing the terms of reference for the Data Management and Interpretation Work Group which will start meetings during 1978.

OBJECTIVES: 1) Provide technical input to the Data Management and Interpretation Work Group of the Surveillance Subcommittee.
2) Provide technical support for internal Ministry assessments, computer systems development, data storage and retrieval, and requests for information.

SCOPE: The project involves activities in many areas including:

1. water quality data storage
2. data retrieval
3. statistical analysis
4. graphical analysis and mapping
5. data transfer and exchange
6. report preparation and editing
7. data interpretation
8. technology transfer
9. representation of the Ministry on SSC Work Groups, etc.
10. systems and program development
11. preparation of revision of optimized surveillance plans based on data evaluation, i.e. timing the surveillance plan.
12. long range systems forecasting

OUTPUT:	Preparation of reports as outlined for various projects elsewhere in this summary preparation of software documentation, seminars, technical papers on data analysis techniques, etc. Input to the annual report of the Surveillance Subcommittee and input to lake by lake surveillance plans.
MANPOWER:	Manpower allocations are included in the individual area projects.
BUDGET:	Incorporated in individual projects and under committees.

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