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INVENTORY OF RESEARCH PROJECTS 1979–80

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Ontario

Ministry of the Environment

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

Graham W. S. Scott,
Deputy Minister

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F.Y. 1979/1980

INVENTORY OF RESEARCH PROJECTS

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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 the Inventory 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 Inventory consists of profiles of the individual research projects being conducted by each Branch of the Ministry in the 1979/80 fiscal year, as they were identified by the Branches themselves. It includes in-house activity, as well as research generated by 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; including use of Provincial Lottery Trust Funds;

(2) all research carried out on an in-house basis 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.

In the case of Projects funded in FY 79/80 by the Provincial Lottery Trust Fund they are shown in sequence on the pages marked "PL". These same projects are also shown on the sheets from the respective Branch supervising the Lottery Project.

The Inventory lists Ministry of the Environment Research Projects for FY 79/80 up-to-date October 1, 1979.

FORMAT OF FY 79/80 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 source for additional information on project.
Liaison Officer Supervisor or/ Senior Ministry Official	Shows the personnel responsible for the project.
Research Category	Identifies whether work is done in Ministry (internal) or outside (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 Projects in Years	Starting and Completion Dates.
Budget	Current year total dollars and man years for the project. These are estimates only made prior to start of the project.
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 in some cases 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 Committee (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. Twenty-seven (27) projects are being funded in 1979/80 at a budget of $2.7 million. All but two (2) 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 and 78/79 Research Projects with FY 79/80 Research Projects According to Time Duration

	FY 77/78	FY 78/79	FY 79/80
Projects in their first year	58	60	69
Projects in their second year	25	36	59
Projects in their third year	23	18	23
Projects in their fourth year	9	9	19
Projects existing for five years or longer	25	18	13
Total Research Projects	140	141	183
Projects conducted within the Ministry of the Environment	85	63	102
Projects conducted by Outside Contracts at Universities and Consultants	55	78	81

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Hydrology Cons.	287K
King	30K
U.W.	18K
York, U.T, U.L...	1,000,000
York U.	50K
ORF	8.2K
?	290K
Woods & Gordon	50K
Currie	40K
Peat...	47K

ARB

United Tech	53.5K				
U.WO	(152K)	50K			
UnitedTech	452.K	U.W. (99)	31K		

Pollution Control

Hydrology Consultants

287.5K
(285.7) 145.6
433.1

United Tech.

53.6K
452.0
505.6

Melaven 23.1K

ORF	Beak
8.2	(14.4) 106.2
(200.) 103.5	(260) 141.9
(288.7) 116.3	(260.7) 141.9

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Ministry of the Environment
Ontario

G01-79

AR-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* August, 1979

PROJECT TITLE: Trace analysis and methods development for compounds associated with incinerator effluents and airborne particulate matter

KEY WORDS: trace analysis, method development, gas chromatography, mass spectrometry

PRINCIPLE INVESTIGATOR AND AFFILIATION: Professor F. Karasek, University of Waterloo

LIAISON OFFICER OR SUPERVISOR: Dr. A. Foldes

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

OBJECTIVE:

1. To improve sensitivity and selectivity of analytical methods suitable for complex organic mixtures from combustion sources.

2. To analyze selected samples of materials such as fly ash for compounds such as chlorinated hydrocarbons and PAHs.

DESCRIPTION:

Various environmental air samples, including fly ash from incinerators and other combustion sources, high volume filter samples, and source test samples will be used as test samples for the development of rapid GC-MS analytical methods for parameters such as chlorodibenzo dioxins, chlorodibenzofurans, chlorinated aromatics and chlorinated phenols.

DURATION OF PROJECT: 3 *YEARS* *PRESENT YEAR IS:* 2 *YEAR* *REPORTING DATE:* annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$55,500.00 (2 yr)	$30,000.00	4.5	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

AR-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* August, 1979

PROJECT TITLE: The continuous sampling and analysis of airborne particulate and road dust in a central Toronto location

KEY WORDS: trace analysis, airborne particulate matter, x-ray fluorescence

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. S.G. Lea, Ryerson Polytechnical Institute

LIAISON OFFICER OR SUPERVISOR: Dr. R.B. Caton

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

OBJECTIVE:

1. To establish a sampling station for collection of airborne particulate matter at RPI and to collect samples for one year on an approximately daily schedule.
2. To characterize the collected APM by determining its elemental and compound composition by various means: x-ray diffraction and fluorescence, spectrometry.

DESCRIPTION:

Airborne particulate matter collection sites will be established at two heights above street level at Church and Gerrard Streets in Toronto. Daily samples, whenever possible, will be subjected to x-ray powder diffraction, and x-ray fluorescence, emission spectrography, or atomic absorption spectrometry to determine composition. Data on diurnal and day-to-day composition characteristics will be interpreted in terms of potential sources.

DURATION OF PROJECT 3 *YEARS* — *PRESENT YEAR IS* 1 *YEAR* — *REPORTING DATE* annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	-	$19,725.00	4.5	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

G03-79

AR-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* August, 1979

PROJECT TITLE: Cucumber responses to air pollution in Southern Ontario

KEY WORDS: phytotoxicology, ozone

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. D. Ormrod, University of Guelph

LIAISON OFFICER OR SUPERVISOR: Dr. S. Linzon

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

OBJECTIVE:

To evaluate cucumber crop responses to air pollution (oxidant and SO_2) by means of detailed observations of the nature and onset of injury during the 1979 growing season and by undertaking chemical protectant treatment experiments in the field.

DESCRIPTION:

Observations of plant injury and measurements of oxidant concentration will be used to evaluate cultivar sensitivity in controlled environments and in the field, to determine the nature of leaf injury and growth retardation in the cucumber, to evaluate cultivar and chemical protectant interactions in controlled environment, in open-topped chambers and in the field and to determine the role that might be played by sulphur dioxide alone or in combination with ozone.

DURATION OF PROJECT: 3 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE:* annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	-	$9,380.00	3	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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* August, 1979

PROJECT TITLE: Verification studies for the use of passive dosimeters for time-weighted-average air pollutant measurements

KEY WORDS: passive dosimeter, trace atmospheric gas analyser (TAGA)

PRINCIPLE INVESTIGATOR AND AFFILIATION Prof. J.B. French and Dr. N.M. Reid, University of Toronto

LIAISON OFFICER OR SUPERVISOR Dr. E. Singer

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

OBJECTIVE:

To verify that the passive dosimeter provides an equally accurate and precise TWA determination of organic vapour contaminant concentration as the conventional pumped trap system.

To complete studies to show that the TAGA can be used as the analyser for a passive dosimeter system.

DESCRIPTION:

Laboratory studies and field trials near industrial emission sources will be carried out to compare the passive dosimeter with presently accepted techniques involving actively-pumped adsorption/absorption devices.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$33,900.00(2 yr.)	$16,220.00	3	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

G05-79

AR-5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* August, 1979

PROJECT TITLE: Monitoring sulphuric acid in air using the TAGA system

KEY WORDS: sulphuric acid, emissions, measurement, Trace Atmospheric Gas Analyses (TAGA)

PRINCIPLE INVESTIGATOR AND AFFILIATION: Prof. J.B. French and Dr. N.M. Reid, University of Toronto

LIAISON OFFICER OR SUPERVISOR: Dr. E. Singer

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

OBJECTIVE:

To develop suitable methodology for the TAGA system to measure sulphuric acid levels in stack gases, plume emissions and ambient air.

DESCRIPTION:

The work programme for the second year of the project will include these studies:

1. introduction and volatilization of aerosol samples of H_2SO_4
2. calibration

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$31,256.00(2 yr.)	$14,916.00	3	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

G06-79

AR-6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* August, 1979

PROJECT TITLE: Continuation of the design and construction of an optimized prototype Pease-Anthony Venturi scrubber

KEY WORDS: Venturi scrubber, design parameters, wet particulate scrubber

PRINCIPLE INVESTIGATOR AND AFFILIATION Profs. A.W. Gnyp and C.C. St. Pierre, University of Windsor

LIAISON OFFICER OR SUPERVISOR Mr. E.T. Barrow

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

OBJECTIVE:

To conclude the correlation of theoretical and experimental research on an optimized Pease-Anthony Venturi scrubber and to compile a complete design manual upon which a commercial unit could be constructed.

DESCRIPTION:

Completion of the program will include optimization of liquid jet penetration to produce uniform liquid core flux distributions and minimum film flow, which correspond to maximum particle collection efficiency. These will involve in part,

1. measurement of jet penetration lengths, liquid film flow rates, droplet mass fluxes, and gas velocity distributions

2. measurement of collection efficiencies for mono-dispense aerosols

3. refinement of other design parameter optimum ranges

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$60,925.00	$10,900.00	5	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

G07-79

AR-7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* August, 1979

PROJECT TITLE: Laser beam monitor of the total volume of particles in stack

KEY WORDS: continuous monitor, emissions, laser scattering, particles

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. J. Motycka, University of Toronto

LIAISON OFFICER OR SUPERVISOR: Mr. V. Ozvacic

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

OBJECTIVE:

To test a functional model of the monitoring instrument under both laboratory and field (stationary source stacks) conditions and to determine characteristics of its performance under these conditions.

DESCRIPTION:

1. Conduct laboratory tests by placing prototype monitor in a test chamber containing known aerosol concentrations
2. Install monitor in an industrial stack to subject it to a wide range of conditions and determine its suitability and reliability
3. Modifiy monitor as required to improve function and reliability
4. Calibrate and test modified prototype
5. Continuation of theoretical studies.

DURATION OF PROJECT: 3 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE:* annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$35,000.00 (2 yr.)	$20,000.00	3	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

G08-79

AR-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* August, 1979

PROJECT TITLE: Effect of ozone on plant cell membranes

KEY WORDS: phytotoxicology, ozone, cell membranes

PRINCIPLE INVESTIGATOR AND AFFILIATION Profs. B.D. McKersie and W.D. Beverodorf, University of Guelph

LIAISON OFFICER OR SUPERVISOR Dr. S. Linzon

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

OBJECTIVE:

To characterize the functional changes occuring in cellular membranes of susceptible and tolerant plants as a result of exposure to ozone.

DESCRIPTION:

The effects of ozone on some of the enzymes associated with the plasma membrane will be investigated in susceptible and tolerant varieties of Phaseolus Vulgaris (White bean). Plasma membrane-enriched fractions will be isolated from the primary leaves of each variety before and at various times after ozone exposure, and enzyme properties determined. In Vitro experiments will also be conducted in which isolated membrane fractions will be exposed to ozone and the effects on enzyme activity monitored.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	-	$9,500.00	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:

REMARKS:

Ministry of the Environment
Ontario

G09-79

AR-9

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* August, 1979

PROJECT TITLE:
Continuous monitoring of PAN in the polluted troposphere

KEY WORDS: PAN, peroxyacetylinitrate, monitoring, oxidant, photochemical smog

PRINCIPLE INVESTIGATOR AND AFFILIATION Prof. E. Cherniak, Brock University

LIAISON OFFICER OR SUPERVISOR Mr. P. Wong

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

OBJECTIVE:

To design, construct and test an automated, possibly portable, microprocessor-controlled GLC PAN analyzer.

To determine the kinetics and mechanism of the homogeneous gas phase thermolysis of PAN, PAN + N_2, PAN + O_2 and PAN + air mixture.

DESCRIPTION:

Preparative GLC techniques will be improved to prepare high purity PAN for celebration purposes and to verify reported infrared absorptivities. Primary analytical standards will be prepared.

Subsequently, a microprocessor-controlled gas sampling system for automatic and repetitive analyses of small air volumes will be designed, built and tested. A GLS system will be designed, built, tested and calibrated and used in the field for preliminary PAN surveys.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$30,900.00(2 yr.)	$16,900.00	3	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

G10-79

AR-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: August, 1979

PROJECT TITLE: The preparation of polynuclear aromatic hydrocarbons as reference compounds required for monitoring purposes.

KEY WORDS: reference standards, polynuclear aromatic hydrocarbons, PAH, synthesis

PRINCIPLE INVESTIGATOR AND AFFILIATION: Prof. J. Ap Simon, Carleton University

LIAISON OFFICER OR SUPERVISOR: Dr. A. Foldes

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

OBJECTIVE:

Develop improved synthetic pathways and synthesize quantities of several PAH's: benzo (b) fluorenthene and benzo (j) fluoranthene; benzo (c) fluorene, dibenzo (ah) fluorene, dibenzo (ag) florene, dibenzo (ac) fluorene, benzo (c) phenenthrene

DESCRIPTION:

Contemporary methods of organic synthesis will be applied to modify published routes to obtain higher yields and greater product specificity. The latter aids in producing higher prints materials with less effort.

DURATION OF PROJECT: 3 YEARS
PRESENT YEAR IS: 2 YEAR
REPORTING DATE: annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$34,186.00(2 yr.)	$17,986.00	3	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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* August, 1979

PROJECT TITLE: Multielement determination of metals and metal compounds in air samples

KEY WORDS: multielement analysis, alkyl lead, alkyl cadmium, gas chromatography - atomic fluorescence spectrometry

PRINCIPLE INVESTIGATOR AND AFFILIATION: Prof. J.C. Van Loon, University of Toronto

LIAISON OFFICER OR SUPERVISOR: Dr. S. Gewurtz

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

OBJECTIVE:

To develop methods for simultaneous multielement analysis of metal compounds for elements such as Pb, Cd, As, Hg, Mn, Fe in air samples. To develop simultaneous multielement techniques for analyzing Pb, Cd, Zn, Fe on air filter particulate samples.

DESCRIPTION:

GC-AFS methods previously developed for lead compounds in air will be extended to Cd and other metals listed above as time and results permit. The combined graphite furnace and flame techniques (CFF-AFS) will be further tested for direct, simultaneous determination on air filters of up to 6 elements.

DURATION OF PROJECT: 3 *YEARS* — *PRESENT YEAR IS* 2 *YEAR* — *REPORTING DATE:* annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$33,200.00(2 yr.)	$19,000.00	3	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

AR-12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: August, 1979

PROJECT TITLE:
Assessment of factors influencing losses in white bean from ozone in Ontario

KEY WORDS:
phytotoxicology, ozone, white bean, crop loss

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

LIAISON OFFICER OR SUPERVISOR
Dr. S. Linzon

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 using EDU antioxidant treatment
2. Determine effect of various agricultural factors on plant sensitivity
3. Establish dose-response relationships by monitoring ozone throughout the growing area

DESCRIPTION:

A large number of bean plots will be monitored for agricultural practice, soil moisture, soil nitrogen, root rot, as well as plant injury due to ozone. Untreated plots and plots treated with EDU antioxidant will be compared.

Ozone concentrations will be monitored by means of Mast oxidant meters at 10 sites in the growing area to supplement MOE data on the ozone concentration field.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$43,797.00	$18,597.00	3	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

G13-79

AR-13

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* August, 1979

PROJECT TITLE: In situ electrostatic precipitation or confinement of particulate emissions from industrial processes.

KEY WORDS: electrostatic precipitation, silicon carbide fumes, fugitive emissions

PRINCIPLE INVESTIGATOR AND AFFILIATION: Prof. I.I. Inculet, University of Western Ontario

LIAISON OFFICER OR SUPERVISOR: Mr. E.T. Barrow

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

OBJECTIVE:

To apply the pilot scale silicon carbide fume electrostatic collector-repeller developed in previous grant years to a large scale and quantitative evaluation in a silicon carbide manufacturing plant. To investigate the applicability of the principle to other processes such as steel making and foundaries.

DESCRIPTION:

The current study will include:

1. Optimization of electrostatic grid design parameters to maximize collection efficiency

2. Experiments to determine ways of recovering collected particulate from the collection grid for disposal

3. Experiments to determine efficiency of collection for various convection velocities, furnace temperatures and other environmental conditions.

4. Feasibility studies of general applications of the method.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$35,992.00(3 yr.)	$17,992.00	4	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

G14-79

AR-14

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: August, 1979

PROJECT TITLE: Feasibility of a tracer technique in combustion with neutron activation analysis for airborne particulate matter

KEY WORDS: road dust, tracer, neutron activation analysis

PRINCIPLE INVESTIGATOR AND AFFILIATION: Prof. R. Fritze, McMaster University

LIAISON OFFICER OR SUPERVISOR: Dr. S. Gewurtz

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

OBJECTIVE:

To complete a feasibility study of the use of an artificially added chemical tracer compound to determine the transport pathways of airborne particulate matter, analysis to be carried out by neutron activation analysis.

DESCRIPTION:

A tracer compound (europium chloride) spead on city streets has been shown to be detectable in high volume filter samples of airborne particulate matter by neutron activation analysis. Studies will continue to develop this method for quantitative application to the determination of the relative contribution of re-entrained road dust to suspended particulate concentrations.

DURATION OF PROJECT: 3 YEARS
PRESENT YEAR IS: 3 YEAR
REPORTING DATE: annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$43,939.00	$10,139.00	4	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

G15-79

AR-15

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* August 1979

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

KEY WORDS:
haze, aerosol, nitrogen oxides, spectrometry

PRINCIPLE INVESTIGATOR AND AFFILIATION
Professor R.W. Nicholls, York University

LIAISON OFFICER OR SUPERVISOR
Dr. S. Gewurtz

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

OBJECTIVE:
To determine the contributing factors to the brown, layered haze which appears over Toronto occasionally, specifically, to determine the relative contribution of suspended particles and nitrogen oxides.

DESCRIPTION:
Measurements of high resolution sky spectra over Toronto region have been recorded for several years. The observational data will be assessed and classified according to type of extinction spectrum. Representative selections of spectra will be analysed quantitatively to deconvolute the scattering (aerosol) and absorption (molecular or N0X) portions of the extinction.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$52,600	$8,000	3.5	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:

REMARKS:

Ministry of the Environment
Ontario

G16-79

RESEARCH AND DEVELOPMENT INVENTORY

AR-16

BRANCH: Air Resources Branch

DATE: August, 1979

PROJECT TITLE: Ground level concentrations of pollutants from flares

KEY WORDS:
flare, dispersion modelling

PRINCIPLE INVESTIGATOR AND AFFILIATION: Professor T.A. Brzustowski, University of Waterloo

LIAISON OFFICER OR SUPERVISOR: Dr. A Venkatram

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

OBJECTIVE:
To develop a model of flares which can be used as input to stack-dispersion calculations to provide predictions of ground level concentrations of unburned flare gases and flame-generated pollutants.

DESCRIPTION:

Measurements will be made on model laboratory flames simulating flares in the space surrounding the flame to characterise penetration of unburned flare gases and flame-generated pollutants (S02, soot, odorants) from the flare. Results of measurements will be combined with other data and mathematical models of flame aerodynamics to produce a model for ground level concentrations of pollutants.

DURATION OF PROJECT: 2 YEARS
PRESENT YEAR IS 1 YEAR
REPORTING DATE: annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	-	$12,950.	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

G17-79

AR-17

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: August, 1979

PROJECT TITLE:
Snow simulation studies for snow collection gauges

KEY WORDS:
snow collection gauge, snow simulation, wind tunnel

PRINCIPLE INVESTIGATOR AND AFFILIATION: Prof. A. Haasz, University of Toronto

LIAISON OFFICER OR SUPERVISOR: Dr. M. Lusis

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

OBJECTIVE: To carry out a detailed and controlled study of performance characteristics of preferred snow collection gauge designs. To evaluate modified designs so that a more efficient collector design could be recommended.

DESCRIPTION: Wind tunnel studies will be undertaken to determine effects of design parameter changes on air flow pattern near the collector, hence on collection efficiency, and on re-entrainment of collected snow.

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS: 2 YEAR — REPORTING DATE: annual

BUDGET:	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	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:

Ministry of the Environment
Ontario

G18-79
AR-18

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: August 1979

PROJECT TITLE: Laser absorption spectrometer for air pollution monitoring: completion of laboratory evaluation and feasibility of long-path absorption technique

KEY WORDS: diode laser, absorption spectrometry, infrared

PRINCIPLE INVESTIGATOR AND AFFILIATION: Prof. J. Shewchun, McMaster University

LIAISON OFFICER OR SUPERVISOR: Dr. S. Gewurtz

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

OBJECTIVE: To complete the laboratory evaluation of the infrared, tunable diode laser as a device for detection and measurement of pollutant gases. To investigate the feasibility of long-path absorption for area monitoring with the instrument.

DESCRIPTION: The final design parameters of the prototype LAS will be determined by laboratory and field experiments on common pollutant gases. Extension of the application of the LAS to new gases such as hydrogen fluoride and PAN will be investigated. Field and theoretical studies of the applicability of the LAS to area pollutant monitoring will be undertaken.

DURATION OF PROJECT: 5 YEARS; PRESENT YEAR IS 5 YEAR; REPORTING DATE: Annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$85,000	$12,000	7.5	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

P01-79

AR-19

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* September 1979

PROJECT TITLE: Comparison of cumulative precipitation collectors in the CANSAP, CCIW and APIOS networks

KEY WORDS: precipitation collectors, rain, snow, wet deposition

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. M. Lusis, Air Resources Branch

LIAISON OFFICER OR SUPERVISOR

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

OBJECTIVE: To establish the comparative performance of cumulative precipitation collection devices used in the three major networks currently operated in Ontario; to determine compatibility of the data generated

DESCRIPTION: MOE will operate precipitation collectors side-by-side with selecte established collectors in two Environment Canada-operated networks. Analysers of precipitation volume and chemical parameters will be carried out to determine whether sampling and analytical techniques applied to the three networks produce comparable results

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$40,000	$40,000	1	1

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:
Jointly with Environment Canada

REMARKS:

Ministry of the Environment
Ontario

AR-20

P02-79

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: 10/9/79

PROJECT TITLE: Model to assess the long-range,long-term impact of SO_2 emission in U.S. and Canada.

KEY WORDS: Long-range transport, SES and APOS

PRINCIPLE INVESTIGATOR AND AFFILIATION: A. Venkatram

LIAISON OFFICER OR SUPERVISOR: D. Yap

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

OBJECTIVE: To develop a model to assess the impact of Ontario SO_2 sources relative to other sources in the U.S. and Canada on the acid precipitation problem.

DESCRIPTION: Two long-term models are being developed. 1) Statistical model: This model uses long-term statistics to study the long-term impact of SO_2 emission. The grid system of the model covers Eastern Canada and the United States. 2) Trajectory model: This model will allow us to look at short-term impact (monthly) of SO_2 emission.

TOTAL PROJECT DURATION: 3 YEARS — PRESENT YEAR IS 1 YEAR — REPORTING DATE ——

BUDGET:	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$ 100k	$ 15k	6	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

P03-79

AR-21

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: 10/9/79

PROJECT TITLE: Model for dispersion in the convective boundary layer - Application in the Sudbury Environmental Study

KEY WORDS: Convective boundary layer - Sudbury Environmental Study

PRINCIPLE INVESTIGATOR AND AFFILIATION: A. Venkatram

LIAISON OFFICER OR SUPERVISOR: D. Yap

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

OBJECTIVE: To develop a dispersion model to predict concentrations during convective conditions in the Sudbury area.

DESCRIPTION: Based on recent understanding of the convective boundary layer a new dispersion model is being developed to estimate concentrations caused by pollutants emitted into the convective boundary layer (warm sunny days). The model is being verified with data collected during field trips in the Sudbury area.

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS 2 YEAR — REPORTING DATE: November 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$ 50k	$ 20k	3	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

LS-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services, Air Quality Section *DATE:* July 12/79

PROJECT TITLE: Development & Documentation of a Procedure for the Determination of Boron in Sediments using Azomethine-H

KEY WORDS: boron, sediments, azomethine-H

PRINCIPLE INVESTIGATOR AND AFFILIATION F.C. DARCEL FCD 7801

LIAISON OFFICER OR SUPERVISOR J.N. BISHOP

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

OBJECTIVE:

To develop a procedure for the determination of boron in aqueous extracts of sediments

DESCRIPTION:

Experience has shown that interferences can occur using the curcumin method for water extracts of sediments. Literature search indicated Azomethine-H to be promising.

Method development with Azomethine-H will be integrated with improved procedures for hot water extraction and measures to decolourize extracts prior to colour development. Broadening the scope of the procedure to include other sample types will also be examined.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1979 *YEAR* *REPORTING DATE* Jan./1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	4000	2000	50	20

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:

Ministry of the Environment
Ontario

LS-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services, Air Quality Section

DATE: July 12/79

PROJECT TITLE: Determination of Low Level Sulphide in Waters by Differential Pulse Cathodic Stripping Voltammetry (DPCSV)

KEY WORDS: sulphide, water, cathodic stripping voltammetry

PRINCIPLE INVESTIGATOR AND AFFILIATION: R.S. SADANA — RS 7901

LIAISON OFFICER OR SUPERVISOR: J.N. BISHOP

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

OBJECTIVE:

To develop an analytical method for the determination of sulphide in waters

DESCRIPTION:

Sulphide level as low as 5 ug l^{-1} is reported toxic to the fish and other forms of life in natural waters. The Water Quality Criteria for $S^=$ is under revision and expected to be far below our existing molybdenum blue method's detection limit of 20 ug/L. Current $S^=$ preservation technique is also inadequate and requires modification to meet our needs.

A literature review of existing methodologies will be followed by the development of a sensitive DPCSV method for the low level $S^=$ in waters. The method will be compared with the I.S.E. and molybdenum blue methods. A sample preservation technique will also be investigated. Interference, precision and accuracy studies will be the integral part of this project.

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DURATION OF PROJECT: 1 YEARS — PRESENT YEAR IS —— YEAR — REPORTING DATE: March/1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	9000	9000	.4	.4

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:

Ministry of the Environment
Ontario

LS-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services, Air Quality Section

DATE: July 12/79

PROJECT TITLE: Analysis of biomaterials by the Jarrell-Ash Atomcomp direct reading plasma emission spectrophotometer

KEY WORDS: emission, ICP biomaterials

PRINCIPLE INVESTIGATOR AND AFFILIATION: M.M. MOSELHY — MMM 7901

LIAISON OFFICER OR SUPERVISOR: J.N. BISHOP

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

OBJECTIVE:

To determine the feasibility of analyzing biomaterial digests using the J.A. Atomcomp

DESCRIPTION:

Composite vegetation samples will be prepared and analyzed by atomic absorption, XRF and the Atomcomp. The results will be compared and the relative merits of each technique, precision, accuracy, speed will be evaluated. A similar process will be used for animal tissue digests

DURATION OF PROJECT: 1 YEARS — PRESENT YEAR IS —— YEAR — REPORTING DATE: March/1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	6000	6000	.2	.2

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:

Ministry of the Environment
Ontario

LS-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services, Air Quality Section

DATE: July 12/79

PROJECT TITLE: Emission Spectral Analysis of Anachemia and Tricil Wastes

KEY WORDS: Multielemental Analysis - Analysis of Tricil Wastes - ICP - ES Analysis - Emission Spectroscopy

PRINCIPLE INVESTIGATOR AND AFFILIATION: M.M. MOSELHY — MM 7801

LIAISON OFFICER OR SUPERVISOR: J.N. BISHOP

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

OBJECTIVE: To optimize experimental conditions for the analysis of Tricil materials for heavy metals

DESCRIPTION:

The ICP as a source for spectral excitation provides the sensitivity, reduced interelement and matrix interferences required for the analysis of complex materials.

Sample preparation methods will be investigated and a suitable technique chosen. The ICP direct reader will be optimized for the matrix and elements of interest.

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS: 2nd YEAR — REPORTING DATE: As required

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	10000	2000	.4	.1

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:

Ministry of the Environment

Ontario

LS-5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services, Air Quality Section

DATE: July 12/79

PROJECT TITLE: Automated Analysis of Mercury in Water

KEY WORDS: Automated, Mercury, Water

PRINCIPLE INVESTIGATOR AND AFFILIATION: DR. B.R. LOESCHER — BRL 7702

LIAISON OFFICER OR SUPERVISOR: J.N. BISHOP

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

OBJECTIVE:

The development of a totally automated system for the analysis of mercury in water

DESCRIPTION:

The present manual system although precise and accurate is very time consuming. There are published procedures describing automated mercury in water analysis which should be adaptable to our needs

Existing literature methods will be evaluated and an apparatus assembled and optimized. Standards and samples will be run in parallel with the manual procedure

DURATION OF PROJECT: 2 *YEARS* — *PRESENT YEAR IS* 2nd *YEAR* — *REPORTING DATE* Feb./79

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	7000	2000	.3	.1

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:

Ministry of the Environment
Ontario

LS-6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services, Air Quality Section

DATE: July 12/79

PROJECT TITLE: Ammonia by Flame Emission

KEY WORDS: Ammonia, flame emission

PRINCIPLE INVESTIGATOR AND AFFILIATION: DR. J.C. HIPFNER — JCH 7902

LIAISON OFFICER OR SUPERVISOR: J.N. BISHOP

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

OBJECTIVE:

To investigate the possibility of analysing acid digests of plant and sediment material for total nitrogen by flame emission analysis of NH^3

DESCRIPTION:

In hydrogen/nitrogen/air flame, NH has been reported to emit strongly at 336 nm as NH. Ammonia generated in alkaline solution is flushed into the burner with N_2& H_2 is added to the gas stream

Ref: Butcher & Kirldsright, Analyst, 103 1104 (1978)

Using a generator similar to those used in hydride methods, i.e. As and Se, NH_3 will be generated and directed into a stream of N_2 and H_2. Flame emission mode on a AA unit will monitor the NH band generated

DURATION OF PROJECT: 1 YEARS — PRESENT YEAR IS 1979 YEAR — REPORTING DATE: March/80

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	6000	6000	.3	.3

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:

Ministry of the Environment
Ontario

LS-7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services, Air Quality Section

DATE: July 12/79

PROJECT TITLE: Evaluation of Extraction Procedures for SO_4/NO_3 in Hi-vol Filters

KEY WORDS: sulfate, nitrate, Hi-vol filters, extraction procedures

PRINCIPLE INVESTIGATOR AND AFFILIATION: DR. J.C. HIPFNER — JCH 7901

LIAISON OFFICER OR SUPERVISOR: J.N. BISHOP

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

OBJECTIVE:

To determine optimum extraction procedure for analysis of Hi-vol glass fiber filters for anion analysis (SO_4, NO_3 and possibly Cl^-, PO_4 (NH_4)). To reduce time spent extracting filters

DESCRIPTION:

Current method requires a 1.5 hour hot water digestion followed by a filtration step to remove extracted particulate and filter fibers prior to automated colourimetric analysis. Work carried out by J. Crowther and other preliminary investigations suggest that >98% of the ions can be extracted with gentle agitation and room temperature.

The above procedure may not be applicable to glass fiber filters due to disintegration of the filter medium. Other forms of agitation, including ultrasonic (low and high intensity) will be investigated. Extension of previous work with heating times will be concluded.

DURATION OF PROJECT: .5 YEARS — PRESENT YEAR IS: 1979 YEAR — REPORTING DATE: Sept./79

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	3000	3000	.2	.2

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

LS-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services, Air Quality Section

DATE: July 12/79

PROJECT TITLE: Determination of the Collection Efficiency of Glass Fibre Filters for Arsenic, Cadmium, Selenium and Antimony

KEY WORDS: Arsenic, Cadmium, Fibre, Filter, Efficiency

PRINCIPLE INVESTIGATOR AND AFFILIATION: A.B. FOSTER/B.R. LOESCHER — ABF 7801

LIAISON OFFICER OR SUPERVISOR: J.N. BISHOP

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

OBJECTIVE:

To determine the true arsenic, cadmium, selenium and antimony levels in ambient air

DESCRIPTION:

Literature and preliminary investigations indicate a glass fibre filter may only collect 10% of arsenic in ambient air. Analysis of such filters would indicate low ambient air levels

Exhaust air from Hi-Vol filter is scrubbed with 0.1N NaOH and balance between glass fibre and 0.1N NaOH determined. Other filters and scrubber solutions will be investigated

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS: 1st YEAR — REPORTING DATE: Oct./80

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
8000	5000	.4	.3

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:

Ministry of the Environment

Ontario

LS-9

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services, Air Quality Section

DATE: July 12/79

PROJECT TITLE: Determination of total suspended particulate on Whatman 41 filters

KEY WORDS: total suspended particulate, TSP, Whatman 41 filter

PRINCIPLE INVESTIGATOR AND AFFILIATION: A.B. FOSTER ABF 7901

LIAISON OFFICER OR SUPERVISOR: J.N. BISHOP

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

OBJECTIVE:

To establish a procedure for the determination of TSP on Whatman 41 filters

DESCRIPTION:

Whatman 41 filters are very hygroscopic thereby rendering TSP determinations difficult. However, they are much superior to glass fibre filters in terms of metal blank levels and workability.

Extended (12 day) conditioning at constant temperature and humidity prior to weighing should provide consistent values. Glass fibre and Whatman filters are currently being run in parallel. The values will be compared and a report written.

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DURATION OF PROJECT: 1 YEARS *PRESENT YEAR IS* ——— YEAR *REPORTING DATE:* March/1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	4000	4000	.2	.2

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:

Ministry of the Environment

LS-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* June 21, 1979

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

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

LIAISON OFFICER OR SUPERVISOR A. Burger, L.T. Vlassoff

RESEARCH CATEGORY: requested

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

OBJECTIVE: Bacteriological 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 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.

DURATION OF PROJECT 2 yrs YEARS *PRESENT YEAR IS* 2nd YEAR *REPORTING DATE* 1980

BUDGET:

TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
59,000	59,000	25,000	2.4	1.0

SOURCE OF FUNDS:

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

IS A REPORT ANTICIPATED?
Interum Report, Annual Report, Final Report, Methods Manual

PARTICIPATION BY OTHER MINISTRIES:

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

Ministry of the Environment

Ontario

LS-11

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* January 1977

PROJECT TITLE: Use of automated clean-up system for PCB analysis in fish.

KEY WORDS: automation - clean-up - fish - PCB's - pesticides

PRINCIPLE INVESTIGATOR AND AFFILIATION Y. Jones - Pesticides Section

LIAISON OFFICER OR SUPERVISOR G. A. V. Rees

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

OBJECTIVE: Evaluate an automated column chromatographic procedure for cleanup and separation of PCB's and organochlorinated pesticides in fish.

DESCRIPTION: Evaluate several columns for recovery and separation of PCB's and organochlorine compounds.
- evaluate the clean-up efficiency of each column.*
- automate system by addition of switching valve, automatic sampler and fraction collector

* i.e. the degree of separation of lipids from PCB's & organochlorin

BACKGROUND: Present time-consuming clean-up procedures do not supply the automated GC System with sufficient fish samples, thus it is imperative to devise an automated procedure able to provide a steady flow of cleaned-up samples for full use of the automated GC systems. Clean-up of fish samples involves removal of lipids and separation of PCB's from organochlorinated pesticides.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1979/80 *YEAR* *REPORTING DATE* December 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$15,000	$7,500	0.6	0.3

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

IS A REPORT ANTICIPATED? Yes - type of report undecided.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Column evaluation in progress for clean-up of fish samples, April, 1977.

April, 1978: Pre-column evaluation completed for Lipid-PCB/OC split. Single μ-NH_2 Column efficient for PCB-OC separation in

Cont. on page 2

standard solutions. Two-column analytical system being evaluated for more efficient resolution of PCB's and OC's in samples. Design for automation completed and costed.

May, 1979: Two-column micro-NH_2 system has been evaluated and found satisfactory for OC/PCB separation. Parts required for automation have been purchased and automated system will be further tested to ensure adequate functioning of whole system. Further evaluation of analytical and guard column is required in order to reduce analysis time and solvent volumes.

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Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES BRANCH *DATE:* July 14, 1978

PROJECT TITLE:
Automated extraction of water for analysis of organochlorine pesticides and polychlorinated biphenyls.

KEY WORDS: automation - extraction - water - pesticides - PCB - environment

PRINCIPLE INVESTIGATOR AND AFFILIATION O. W. Berg, Research Group, Pesticide Section

LIAISON OFFICER OR SUPERVISOR G. A. V. Rees

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

OBJECTIVE:
To develop an automated procedure for extraction of pesticides and PCB's from water samples in order to free staff for work in other critical areas of the laboratory.

DESCRIPTION:

A liquid-liquid extraction procedure using a Teflon helix coil as a mixing chamber will be evaluated for recovery of pesticides and PCB's.

Fluid dynamics will be evaluated to ensure safety of sample bottle pressurization and optimize flow rates in the mixing chamber. Solvent/water ratio will be optimized and recovery studies conducted.

A phase separator will be designed and tested. An inexpensive continuous evaporator for extract concentration will be designed and evaluated.

Automatic control will be added and tested, involving cyclic timer operated solenoids.

This will permit simultaneous, unattended extraction of 6-8 samples per hour.

DURATION OF PROJECT 2 ——— *YEARS* *PRESENT YEAR IS* 79/80 ——— *YEAR* *REPORTING DATE* October 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$9,000	$4,000	2/3	1/3

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

IS A REPORT ANTICIPATED?
Yes, but still undecided as to what type of report will be published.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

August 22, 1978: Initial evaluation of fluid dynamics is promising with 90% recovery of test pesticide. The phase separator has been designed, manufactured and found to function well. A unique (free falling drop counter-current) evaporator has been designed and is being tested.

May 1979: Initial evaluation of the system has been completed. Further work involves

exploratory experiments: a prototype of an automatic extraction apparatus indicated that the unit was of sound design. The unit must now be tested with a variety of biocides and herbicides using artificial and natural samples.

A statistically valid number of aqueous samples containing various pesticides will be prepared, extracted by conventional techniques and quantitated by standard methods. Similar procedures will be applied using the automatic extraction apparatus and the results will be compared and analyzed statistically.

Ministry of the Environment

Ontario

LS-13

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* June 7/79

PROJECT TITLE: Development of a Novel Pumping System for HPLC

KEY WORDS: HPLC - pumping system -

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. O. W. Berg
Research Group - Pesticides Section

LIAISON OFFICER OR SUPERVISOR G. A. V. Rees

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

OBJECTIVE: To develop a low-cost pulseless pumping system for HPLC.

DESCRIPTION: Commercially available, pulseless pumps are quite adequate in design but mechanically complicated and costly. A very elementary pulseless pump operated with compressed air was developed some 10 years ago, which has recently been modified to prevent the leaching of interfering materials. The pulseless flow characteristics are ideal and its pneumatic operation lends itself to easy automation via electronically controlled solenoid valves. A maximum operating pressure of 5000 psig can be obtained by driving the bellows with cheap pulseless gear pumps, while the use of compressed air will give a maximum pressure of 2,000 psig.

DURATION OF PROJECT Pending YEARS *PRESENT YEAR IS* 79/80 YEAR *REPORTING DATE* March 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$7,800	$7,800	1/4	1/4

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

IS A REPORT ANTICIPATED? Yes - type of report still undecided

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

LS-14

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* May 17, 1979

PROJECT TITLE: Static mixers as Laboratory Solvent Extractors

KEY WORDS: extractors - static mixers - pesticides - PCB's - dioxins

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. O. W. Berg
Research Group - Pesticides Section

LIAISON OFFICER OR SUPERVISOR G. A. V. Rees

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

OBJECTIVE:
To develop rapid and effective general extraction procedures for aqueous samples containing a variety of environmentally hazardous chemicals, including PCB's and chlorinated dioxins.

DESCRIPTION:
An essential part of any analytical procedure involving biochemically active chemicals in aqueous samples is solvent extraction. This extraction involves prolonged, intimate solvent contact with the sample and subsequent phase separation. These two can be combined and potentially automated by using a recently developed concept based on static mixers. The fixed geometric design of the Kenics mixer produces unique patterns of flow division and radial mixing simultaneously. A statistically valid number of aqueous samples containing various pesticides will be extracted by conventional techniques and quantitated using standard methods. Similar procedures will be applied to the Kenics unit and the results will be compared and statistically analyzed. Both heavier- and lighter-than-water solvents will be evaluated. Conventional fast-flow phase separators will be used.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 79/80 *YEAR* *REPORTING DATE* March 1980

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$5,000	$5,000	1/6	1/6

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

IS A REPORT ANTICIPATED? Yes, but type of report undecided as yet.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

LS-15

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* May 14, 1979

PROJECT TITLE: Development of Electronic Controls for Automated Analytical Procedures

KEY WORDS: automation - analysis - electronic - controls pesticides

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. O. W. Berg
Research Group - Pesticides

LIAISON OFFICER OR SUPERVISOR G. A. V. Rees

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

OBJECTIVE: To develop electronic and other control systems suitable for the automatic operation of analytical procedures.

DESCRIPTION: An essential part of any automated procedure is a suitable control system. A flexible programmable timer/controller is required which can be purchased. However, such a timer has a serious shortcoming in that it is not capable of detecting any errors in the analytical process stream. If any of the components fails, the entire sample batch is lost. To obviate this problem, an error detecting device and a feedback loop are required which can be obtained through the purchase of a suitable microprocessor which can be programmed to provide the control functions necessary in an automated analytical procedure. With further knowledge obtained through a digital electronic self-instruction course, it will be possible to construct electronic control devices and interface them with analogue components.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 79/80 *YEAR* *REPORTING DATE* March 1980

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$15,000	$15,000	½ year	½ year intermittent

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

IS A REPORT ANTICIPATED? Yes, but type of report undecided as of yet.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

LS-16

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* June 7/79

PROJECT TITLE: Development of High Resolution Capillary Columns to Improve Current Analytical Techniques

KEY WORDS: capillary GC/MS, capillary columns, pesticide analysis

PRINCIPLE INVESTIGATOR AND AFFILIATION H. Tosine

LIAISON OFFICER OR SUPERVISOR G. A. V. Rees

RESEARCH CATEGORY:

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

OBJECTIVE:

To develop highly sensitive gas chromatographic capillary columns to resolve complex organic mixtures; to adapt these capillary columns to GC/MS confirmational analysis and to routine pesticide residue analysis.

DESCRIPTION:

A capillary GC/MS system will be developed which will be capable of detailed evaluation of complex mixtures of toxic organics in environmental samples. The capillary columns will be adaptable to existing automated GC analysis of pesticides and will complement the project for the detection and identification of PCB components in ambient air samples.

DURATION OF PROJECT 1 —— *YEARS* *PRESENT YEAR IS* 79/80 —— *YEAR* *REPORTING DATE* May 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$15,000	$15,000	0.4	0.4

SOURCE OF FUNDS:

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

IS A REPORT ANTICIPATED? Yes, but type of report still undecided.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

LS-17

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* June 7/79

PROJECT TITLE: Development of Sample Clean-up Methodologies for GC/MS.

KEY WORDS: HPLC, Clean-up, GC/MS.

PRINCIPLE INVESTIGATOR AND AFFILIATION H. Tosine

LIAISON OFFICER OR SUPERVISOR G. A. V. Rees

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

OBJECTIVE: To develop an efficient clean-up methodology for complex samples through use of steam distillation, HPLC, size exclusion chromatography.

DESCRIPTION: For highly sensitive, high resolution analysis of complex environmental samples such as fish and chemical landfill sites for trace components, a very efficient clean-up/ extraction method is needed. Steam distillation will be tried as a selective extraction method for PCB's and pesticides from a lipid matrix. HPLC and gel permeation will also adapt well to automation.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 79/80 *YEAR* *REPORTING DATE* April 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$7,000	$7,000	0.4	0.4

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

IS A REPORT ANTICIPATED? Yes, but type of report still undecided.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

LS-18

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* June 7, 1979

PROJECT TITLE: Development of Analytical Methodology for Analysis of Chlorodibenzofurans and Dioxins in Environmental Samples

KEY WORDS: Analysis, Dioxin, GC/MS, Water, Fish, Sediment, Air, Capillary GC/MS

PRINCIPLE INVESTIGATOR AND AFFILIATION H. Tosine

LIAISON OFFICER OR SUPERVISOR G. A. V. Rees

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

OBJECTIVE: To devise, test and utilize isolation, cleanup and detection of chlorodibenzofurans and dioxins in air, water, fish, sediment and chemical landfill sites.

DESCRIPTION: The analysis of complex environmental samples for furans and dioxins is complicated by interfering hydrocarbons and other chlorinated congeners. A method will be developed which will quickly and efficiently clean up and separate the chlorinated furans and dioxins from interferences. The chromatographic clean up will be complemented by capillary GC/MS, providing a refined separation of the isomers of the furans and dioxins for quantitation by computer.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 79/80 *YEAR* *REPORTING DATE* April 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$10,000	$10,000	0.4	0.4

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

IS A REPORT ANTICIPATED? Yes, type of report still undecided.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

LS-19

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* August, 1978

PROJECT TITLE: High-performance Liquid Chromatographic Analysis of Polar Pesticides and Metabolites.

KEY WORDS: high-performance liquid chromatography (HPLC), analysis, pesticides

PRINCIPLE INVESTIGATOR AND AFFILIATION P. Baulu
Research Group - Pesticides Section

LIAISON OFFICER OR SUPERVISOR G. A. V. Rees

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

OBJECTIVE: To develop analytical procedures for polar pesticides in environmental samples, using high-performance liquid chromatography (HPLC).

DESCRIPTION: Gas chromatography (GLC) has been the preferred method of detection of pesticides, but HPLC is proving useful for analysis of pesticides not detectable by GLC.

The initial step will be to optimize HPLC conditions for carbamate analysis using various detector wavelengths in the U.V. range and several solvent combinations on different types of columns.

Use of the HPLC will then be extended to analysis of other pesticides and metabolites.

DURATION OF PROJECT 0.3 *YEARS* *PRESENT YEAR IS* 79/80 *YEAR* *REPORTING DATE* Oct. '79

BUDGET:

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

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

IS A REPORT ANTICIPATED? Yes, but type of report still undecided.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: May 1979: Due to a change in priorities, this project was not begun as anticipated. Work is now underway.

Ministry of the Environment

Ontario

RAC 01-79

LS-20

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* 23/5/79

PROJECT TITLE:

Analysis of Metals in Vegetation by X-ray Fluorescence Spectrometry

KEY WORDS: metals, vegetation, XRF

PRINCIPLE INVESTIGATOR AND AFFILIATION J.A. Pimenta, R. Judge MOE

LIAISON OFFICER OR SUPERVISOR A.C. Rayner MOE

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 on vegetation samples with a minimum of sample preparation.

APPROACH:

1) prepare calibration curves for the matrix elements, Ca,K,Cl,P,S, Si. Mg,Na. The XRF calibration curve will be prepared from samples previously analysed by either gravimetric AOAC or AAS methods.

2) prepare calibration curves for Cu,Ni and Zn using samples analysed by AAS. Correct the fluorescence intensity for matrix effects.

3) prepare artificial standards by adding heavy metals to cellulose powder and generate calibration curves.

4) Compare artificial calibration curves to experimental curves for Cu,Ni and Zn and correct if necessary.

5) Apply artificial calibration curves to remaining heavy metals in vegetation samples. Perform inlab tests on selected samples to check validity of artificial calibration curves for those metals.

DURATION OF PROJECT Two —— *YEARS* *PRESENT YEAR IS* 2nd —— *YEAR* *REPORTING DATE* April 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	30,000	10,000	1 yr.	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:

Ministry of the Environment

Ontario

RAC 02-79

RESEARCH AND DEVELOPMENT INVENTORY

LS-21

BRANCH:

DATE: 3/7/79

PROJECT TITLE: The development of an Analytical procedure for the analysis of Asbestos collected on Delbag filters.

KEY WORDS: Asbestos airborne, TEM, Delbag filters, TEM

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. A.A. Hinds, Dr. J. Pimenta & Dr. P. Roberts

LIAISON OFFICER OR SUPERVISOR: A.C. Rayner

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

OBJECTIVE:

1. To develop an optimal procedure for determining the concentration of asbestos fibres collected on delbag filters
2. To compare the precision and accuracy of the method with those of the proposed EPA method.

DESCRIPTION: The determination of asbestos fibre concentrations in air has presented major difficulties to analysts over the past several years because of the problems connected with sample collection and fibre identification and enumeration by electron microscopy. The use of delbag filters would seem to alleviate many of the problems associated with sample collection and the development of a satisfactory analytical method for Asbestos collected on this medium would offer an improvement on many of the methods currently in use.

Aliquots of exposed Delbag filters will be dissolved in ethyl acetate and the solution (suspension) filtered on a 0.1 um nuclepore filter. The nuclepore filter will then be analyzed by the direct-transfer method.

Factors such as, aliquot size, volume of solvent, area of filtration surface, possible losses of fibre in the procedure and contamination will be thoroughly studied.

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS: 1st YEAR — REPORTING DATE: April 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	10,000	5,000	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:

REMARKS:

Ministry of the Environment

Ontario

LS-22

RESEARCH AND DEVELOPMENT INVENTORY

RAC 03/79

BRANCH:

DATE: 23/5/79

PROJECT TITLE: Identification and characterization of respirable particulate matter from various emission sources.

KEY WORDS: Respirable dust, Particle Identification, Industrial Emission

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. J.A. Pimenta Dr. A.A. Hinds

LIAISON OFFICER OR SUPERVISOR: A.C. Rayner

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

OBJECTIVE:

To develop methods for the sampling and identification of air borne dust from emission sources (with special reference to the respirable fraction of the dust), with a view to recommending abatement measures.

DESCRIPTION: The traditional method for sampling air particulate matter has been the hi vol sampler, which collects particles <100 um in diameter. Recently, emphasis is being placed on the respirable portion of the dust, especially the fraction <2.5 um. A new sampler, developed by the USEPA, is now on the market. It samples air borne dust in two fractions 15 um - 2.5 um and less than 2.5 um. The proposed study would test this sampler and develop methods for the analysis of the collected material by XRF and SEM.

Approach:

(1) test instruments and filter media
(2) prepare calibration curves for XRF

DURATION OF PROJECT: 2 YEARS PRESENT YEAR IS 1st YEAR REPORTING DATE: Dec. 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	45,000	15,000	1.5 yrs.	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

RAC 04-79

RESEARCH AND DEVELOPMENT INVENTORY

LS-23

BRANCH: Laboratory Services *DATE:* May 24/79

PROJECT TITLE: The development of analytical techniques for the characterization and quantitation of synthetic and naturally occuring mineral fibres in Ontario. (exluding Asbestos)

KEY WORDS: glass fibre, zeolites, amphiboles, SEM, TEM, EDX, SAED, XRF

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. A.A. Hinds and Dr. P.J. Roberts

LIAISON OFFICER OR SUPERVISOR A.C. Rayner

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

OBJECTIVE:
1. To compile physical and chemical properties of fibrous materials and minerals of commercial importance or Environmental Health Significance.
2. To develop analytical (techniques) procedures to identify and distinguish between mineral species.

DESCRIPTION: There is increasing evidence that mineral fibres other than asbestos are capable of producing mesothelioma and other "asbestos-related" diseases in laboratory animals and most recently humans. Since asbestos was first recognized as a human carcinogen efforts have been made to find substitutes for its many applications, the most notable being glass fibre. Unfortunately glass fibre has also been found to produce toxic symptoms in laboratory animals and while the search continues for suitable safe substitutes for asbestos it is timely for analytical methods to be developed to characterize and quantitatively determine the spectrum of mineral fibres of commercial or possible commercial importance.

Approach:
1. To collect samples (about 80) of known fibrous mineral deposits in Ontario and fibrous materials that are used commercially.
2. To characterize those fibrous material by SEM, TEM and SAED. Special attention will be paid to distinguishing those minerals which may interfere with asbestos identification.
3. To explore the feasibility of employing an image analysis system for positive identification of minerals.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$20,000	7,500	1	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: Natural Resources and Labour may be requested to assist in sample collection.

REMARKS:

Ministry of the Environment

Ontario

RAC 05-79

LS-24

RESEARCH AND DEVELOPMENT INVENTORY

May 1979

BRANCH: DATE:

PROJECT TITLE: Identification of particulate emissions from heavy industrial operations

KEY WORDS: Industrial Emissions, Particle Identification

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. J.A. Pimenta, Dr. A. Hinds

LIAISON OFFICER OR SUPERVISOR: A. Rayner

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

OBJECTIVE: To develop a method for the identification of emission sources from steel plants, foundries, power plants, etc., with a view to aiding in abatement programs.

DESCRIPTION: Samples of particulate matter from emission sources in cities such as Hamilton, Sault Ste.Marie, Windsor, and Cambridge are to be further investigated analytically in order to identify the various components of the dust material. Component identification is of great value in localization of sources.

Approach
(1) Collect and catalogue particulate matter from known sources.
(2) Select sites for sampling by dustfall, Hi-volume and Anderson type samplers.
(3) Characterize collected samples by XRD, XRF, optical microscopy and SEM.
(4) Identify sources by comparisons with known materials.
(5) Introduce methodologies for use in Regional Abatement programs.

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS 1st YEAR — REPORTING DATE Dec./81

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	25,000	10,000	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:

REMARKS:

Ministry of the Environment

Ontario

3/7/79

RESEARCH AND DEVELOPMENT INVENTORY

LS-25

BRANCH: DATE:

PROJECT TITLE: The characterization and enumeration of atmospheric particulates deposited on vegetation

KEY WORDS: air particulates, SEM, EDX, vegetation

PRINCIPLE INVESTIGATOR AND AFFILIATION: A.A. Hinds, P.J. Temple

LIAISON OFFICER OR SUPERVISOR: A.C. Rayner, S.N. Linzon

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

OBJECTIVE:

1. To characterize, in situ, by means of the SEM and X-ray spectrometry, particulate matter deposited on vegetation.

2. To develop an SEM based analytical procedure for determining particulate loadings on vegetation.

DESCRIPTION: Characterization and Enumeration of atmospheric particulates deposited on Vegetation There have been several reports in the literature which suggest that (urban) trees have considerable potential to function as particulate air filters. It is therefore critically important to assess the efficiency of tree surfaces for particle capture, especially in areas with contaminated atmospheres because important consequences for vegetative and human health may be revealed.

It is proposed that the distribution, size and chemistry of particles collected on leaf, twig, branch and stem surfaces be studied. Sampling will initially be limited to one crown position (of selected species), during the summer months and in the vicinity of an emission source. It (sampling) may however be extended to include various crown positions, all seasons of the year, and trees of various species, age and health.

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
10,000	2,500		~~23 EMD~~

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-26

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH:

DATE: May 1979

PROJECT TITLE: A comprehensive Review of the Literature on the Application of Physical Techniques in Environmental Analysis

KEY WORDS: TEM,SEM,EDX,XRF,XRD,DTA/DTGA,NAA,SEDIMENT,SOIL,WATER,AIR PARTICULATES,VEGETATION-ANALYSIS

PRINCIPLE INVESTIGATOR AND AFFILIATION: A.A. Hinds

LIAISON OFFICER OR SUPERVISOR: A.C. Rayner

RESEARCH CATEGORY: internal

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

OBJECTIVE:

(1) To determine general and specific applications of physical analytical systems for the elucidation/monitoring of environmental pollution.

DESCRIPTION:

Physical Analytical Systems generally provide a rapid and non-destructive means of determining chemical & physical characteristics of materials. Because of these advantages it is intended to expand the scope of their applications.
All major data bases, plus all relevant journals will be searched and pertinent information abstracted for the review.

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
2,500	800		10 man days

SOURCE OF FUNDS:

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

IS A REPORT ANTICIPATED? yes - annually

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-27

BRANCH: Laboratory Services

DATE: 23/5/79

PROJECT TITLE: An Investigation of Ultrastructural Changes Induced by Environmental Pollutants as an aid to the diagnosis of pollution injury to vegetation.

KEY WORDS: Ozone, Sulphur Dioxide, Hydrogen Fluoride, Ethylene, Interactions, Cell Structure, TEM, Light Microscopy

PRINCIPLE INVESTIGATOR AND AFFILIATION: A.A. Hinds, P.J. Temple

LIAISON OFFICER OR SUPERVISOR: A.C. Rayner S.N. Linzon

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

OBJECTIVE:

1. To develop procedures for the Routine Examination of Vegetation samples by transmission electron microscopy.
2. To develop criteria for the diagnosis of pollution injury to vegetation based on ultrastructural changes.

DESCRIPTION: The diagnosis of pollution injury to vegetation is extremely important in determining the cause of damage, and in relating this to the source. The symptoms of pollution damage may be confounded with nutrient deficiency symptoms and damage due to plant pathogens, when diagnosis is based upon visual or light microscopic observation. Electron microscopic observation offers a means of characterizing pollution damage at the sub-microscopic level and of distinguishing between pollutants by means of the changes they induce at the ultrastructural level.

1. To develop preparative procedures for the plant tissues
2. To expose selected species to varying concentrations, and different mixtures of pollutant: (eg ozone and SO_2)
3. To record visual symptoms, and structural and ultrastructural changes resulting from exposure.

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS: 2nd YEAR — REPORTING DATE: March 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	15,000	2,000	1.5	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:

REMARKS:

Ministry of the Environment

LS-28

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services

DATE: May 1979

PROJECT TITLE: An evaluation of Selected Filter Media with respect to sampler performance and total suspended particulate analysis

KEY WORDS: air sampler, filter media, total suspended particulate

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. A.A. Hinds

LIAISON OFFICER OR SUPERVISOR: Mr. A.C. Rayner

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

OBJECTIVE: To test the characteristics of various filter media on the Hi-volume air sampler and select a filter for the routine field monitoring for total suspended air particulate matter (TSP) and toxic elements.

DESCRIPTION: Glass fibre filters have been traditionally used to determine TSP. They are unsuitable for the analysis of many chemical elements because of the high background levels of the elements in the filter material. The use of organic filters would enable these elements (Pb, Cd, Ni , Zn) to be analyzed, at low concentrations with greater precision.

1. obtain a variety of filter media of various pore sizes
2. test the filters for chemical background and ability to be weighed
3. test the filter media in the field to determine handling characteristics
4. determine collection efficiency for the various pore sizes

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS 2nd YEAR — REPORTING DATE April '80

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	10,000	4,000	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:

REMARKS:

MOE 1293 6/76

OBJECTIVES

1. To determine the effects of selected filters on high-volume sampler performance at varying particulate loadings.

2. To determine the suitability of such filters for routine field monitoring surveys,

3. To develop and/or standardize procedures for the weighing and handling of filters (eg. to eliminate the static electricity problem with the weighing of the Delbag filter, also to eliminate the tendency of this filter to stick to the filter mount in the cartridge of the sampler).

4. To determine the suitability of the filters for the collection and analysis of asbetiform fibres.

DESCRIPTION CONTINUED:

1. A Selection of commercially available filters, of differing Pore-sizes, will be field tested to determine their flow characteristics.

2. A weight comparison of TSP loadings will be made.

3. Sub-samples of exposed and non-exposed filters will be analyzed to determine:

    Heavy metal concentrations

Ministry of the Environment

Ontario

LS-29

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services

DATE: 23 May 1979

PROJECT TITLE: Evaluation of the Isotope Dilution Method for the Determination of Sulphate by Liquid Scintillation Counting.

KEY WORDS: Isotope dilution, Liquid scintillation counting

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. Paul J. Roberts

LIAISON OFFICER OR SUPERVISOR: Mr. A. Rayner

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

OBJECTIVE: To evaluate the isotope dilution technique as an analytical method for sulphate and, if practicable, to use this method for determining sulphate in low concentrations in plume samples from the Sudbury Environmental Study.

DESCRIPTION: Acquisition of information on the rate of oxidation of SO_2 to SO_4 in stack emissions requires that small amounts of sulphate be measured with a known degreee of precision. The method uses $Ba^{35}SO_4$ held in solution by a mixture of EDTA and ammonia. A small amount of this solution is mixed with a volume of sample extract containing non-radio-active sulphate and, under the proper conditions, the two types of sulphur distribute themselves evenly betwee a $BaSO_4$ precipitate and the solution. A count of the B-activity of the solution can then be used as a measure of the amount of sulphate in the sample. Solutions of sulphate will be prepared at various low concentration levels. These solutions, together with actual filters containing samples obtained in Sudbury plume studies will be analyzed by the proposed technique to determine a.) the suitability and b.) the precision, limit of detection and accuracy of the technique. The outcome of the analytical investigation will determine the direction to be taken in analyzing future samples.

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS: 2nd YEAR — REPORTING DATE: Dec./79

BUDGET: 7,500

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	4,000	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:

REMARKS:

Ministry of the Environment

Ontario

June 1979
LS-30

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:*

PROJECT TITLE: Asbestos Sample Stability and Accuracy of the Interim Method for the Determination of Asbestos Fibre Concentrations in Water by Transmission Electron Microscopy.

KEY WORDS: Asbestos, Chrysotile, Amphibole, Talc, Transmission Electron Microscopy, Low temperature ashing

PRINCIPLE INVESTIGATOR AND AFFILIATION P.J.Roberts Ontario Ministry of the Environment

LIAISON OFFICER OR SUPERVISOR A.C. Rayner, Manager, Physical Methods Section

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

OBJECTIVE: To test the Interim method with U.I.C.C. Chrysotile and Amphibole asbestos suspensions to determine:

(a) percentage recovery of fibres when the ashing procedure is incorporated
(b) percentage recovery of fibres

(c) stability of the suspensions
(d) recovery of fibres with and without an ashing procedure in the presence of potential interfering materials.

DESCRIPTION: Artificial suspensions containing known amounts of chrysotile are prepared and filtered through appropriate filters at various time intervals. The filters are then analyzed with an ashing procedure. Artificial suspensions of chrysotile and talc are mixed and the suspensions filtered and analyzed.

Identical testing procedures are carried out using amphibole asbestos suspensions, with and without ashing.

The accuracy of the method for chrysotile, without using ashing, is to be reported separately, according to the Ministry Inventory of Research Projects 1977/78, page LS-5.

DURATION OF PROJECT 1.5 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Dec. /80

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$ 15,000	$ 7500	1.0	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 Environment
Ontario

LS-31

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH:

DATE: May, 1979

PROJECT TITLE: A study of the localization of heavy metals and other contaminants within plant cells and tissues.

KEY WORDS: heavy metals, air pollution, vegetation damage, SEM, TEM, Electron Microprobe

PRINCIPLE INVESTIGATOR AND AFFILIATION: A.A. Hinds, P.J. Temple

LIAISON OFFICER OR SUPERVISOR: A.C. Rayner, S.N. Linzon

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

OBJECTIVE:
1. To identify sites of heavy metal localization within plant roots, stems and leaves
2. To estimate concentrations of such heavy metals by X-ray microanalysis.

DESCRIPTION: A study of the localization of heavy metals and other contaminants within plant cells and tissues

DESCRIPTION There are several published reports of the use of the electron microscope/electron microprobe for the study of the localization of heavy metals in plant cells and tissues. However most of these have dealt with Pb, to the exclusion of other metals of environmental importance such as, Cd,Cu,Ni, Cr,Zn,Co and Hg, that are commonly found contaminating vegetation near industrial sources. This project will be geared to exploring and developing techniques for the identification and localization of heavy metals, from industrial contamination, in plant tissues in order to determine the effects of these metals on plant structure and function.

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
10,000	3,000		30 EMD

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 LS-32

BRANCH: Laboratory Services, OTC Section *DATE:* June, 1979

PROJECT TITLE: Analysis of Water Treatment Chemicals for Organic Impurities.

KEY WORDS: Trace organics, water treatment chemicals, drinking water.

PRINCIPLE INVESTIGATOR AND AFFILIATION R.F. Bonner, R.D. Smillie

LIAISON OFFICER OR SUPERVISOR O. Meresz

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

OBJECTIVE:

To screen widely used water treatment chemicals for organic contamination.

Identify organic compounds, if any, present and suggest possible sources of their origin.

Make appropriate recommendations if toxic chemicals are identified.

DESCRIPTION:

A number of treatment chemicals are used in the production of drinking water. Chemicals such as alum, ferric chloride, hydrofluosilicic acid, etc. are strictly inorganic and should not contain organic matter.

However, in some cases the inorganic chemicals may be manufactured from recovered acids that have been used in an organic synthetic process. Under such circumstances, some carry-over of organic compounds could occur and present a source of contamination of finished drinking waters.

Various isolation and extraction techniques will be used followed by mass spectrometric identification.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* December, 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$12,500	$4,000	0.4	0.15

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

LS-33

BRANCH: Laboratory Services, OTC Section

DATE: June, 1979

PROJECT TITLE: Occurrence and Identification of Chlorinated Organic Compounds in Technical Chlorine Residues

KEY WORDS: organics, chlorine, chlorination, perchloroorganics

PRINCIPLE INVESTIGATOR AND AFFILIATION: R. B. Bonner

LIAISON OFFICER OR SUPERVISOR: O. Meresz

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

OBJECTIVE: To isolate, separate, and identify chlorinated organic compounds from mixtures left as residues in chlorine evaporation, identify their sources and estimate their environmental impact.

DESCRIPTION:

When chlorine is evaporated in the water treatment process, a residue remains which was shown to contain perchlorinated organic compounds (OTC Report 7902). OTC Scientists suggested the reaction of nascent chlorine with graphite electrodes as potential sources. Should this prove to be the case, a presently unsuspected source of environmentally important organo-chlorine compounds will be uncovered.

The application of several separation techniques will be investigated in aid of mass spectrometric identification. Reference standards will be obtained or synthesized in support of structure determination. Experiments will be designed to test the graphite-chlorine reaction theory.

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS: 1 YEAR — REPORTING DATE: September, 1980

BUDGET:	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$10,000	$7,000	0.3	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

LS-34

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* July, 1979

PROJECT TITLE:
Development of Concentration Techniques for Mutagenic Substances in Environmental Samples.

KEY WORDS: concentration, extraction, organics, mutagens "Ames test"

PRINCIPLE INVESTIGATOR AND AFFILIATION
J. E. Pagel
R. D. Smillie

LIAISON OFFICER OR SUPERVISOR
Dr. O. Meresz

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

OBJECTIVE:
To develop concentration techniques for environmental samples, compatible with testing for mutagenic substances (Ames Test).

DESCRIPTION: Testing of environmental samples for the presence of mutagens/carcinogens presents problems because of detection limits and volume limitations, so that without prior concentration, only highly potent or very concentrated mutagens can be detected. Development of a satisfactory method or methods for concentrating these mutagenic substances would allow monitoring of large numbers of environmental samples by the Ames Test.

A variety of concentration techniques will be evaluated for organic compounds in aqueous samples. From the results the most effective method of concentration will be chosen for the volatile and non-volatile organics; the particulate fraction will be examined using both standard solutions and real samples.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* April, 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$35,000	$14,000	1.5	.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

RESEARCH AND DEVELOPMENT INVENTORY

LS-35

BRANCH: LABORATORY SERVICES BRANCH

DATE: MAY, 1979

PROJECT TITLE:

HIGH RESOLUTION GAS CHROMATOGRAPHY

KEY WORDS: capillary columns, surface modification, coating procedures

PRINCIPLE INVESTIGATOR AND AFFILIATION: M. G. FOSTER

LIAISON OFFICER OR SUPERVISOR: R. F. BONNER

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

OBJECTIVE: Investigation of high resolution gas chromatography (GC) columns for the analysis of complex environmental samples. Examination of preparation methods for wall-coated open tubular columns and comparison with commercial columns.

DESCRIPTION:

The increasing complexibility of environmental samples necessitates higher GC resolution to provide better separation of the individual components prior to mass spectrometric (MS) analysis. This is achieved with capillary columns. Preparation of suitable columns is still an art and this project will attempt to standardize procedures to ensure reproducibility.

Glass tubing of various types will be subjected to a variety of surface modification techniques and coated with a variety of stationary phases. Methods for screening columns at various stages will be incorporated. Prepared columns will be compared with packed and commercial capillary columns

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS: 2 YEAR — REPORTING DATE: APRIL, 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	18,000	10,000	0.8	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

LS-36

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* June, 1979

PROJECT TITLE: A comparison of extraction techniques for polynuclear aromatic hydrocarbon analysis of industrial effluents and natural waters.

KEY WORDS: PAH, extraction, effluents

PRINCIPLE INVESTIGATOR AND AFFILIATION: D. T. Wang

LIAISON OFFICER OR SUPERVISOR: R. D. Smillie

RESEARCH CATEGORY:

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

OBJECTIVE:

To investigate four techniques to determine the most efficient method for the extraction of PAH from effluents and from natural waters.

DESCRIPTION:

Four extraction techniques were evaluated for the analysis of PAH from industrial effluents, and from natural waters. Liquid-liquid extraction, and continuous liquid-liquid extraction were investigated. Also examined were a modified Likens-Nickerson apparatus which operates on the principle of continuous solvent extraction of the steam distillate, and a micro adsorption column packed with 10 um C-18 reverse phase material.

Industrial effluents from steel mills and from oil refineries were found to contain up to 500 ppb of benzo(a) pyrene. The receiving waters (natural waters) contained 4-5 orders of magnitude less benzo(a)pyrene. Recoveries of the PAH for each of the extraction techniques were determined by spiking organic-free water with appropriate PAH at concentrations that simulated both industrial effluents and natural waters.

Finally, industrial effluent samples and natural water samples were analyzed following extraction using the four procedures. The extraction procedures and subsequent clean-ups were geared towards HPLC analysis using a combination of ultraviolet and fluorescence detection.

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

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$7,200	$7,200	.25	.25

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

RESEARCH AND DEVELOPMENT INVENTORY

LS-37

BRANCH: Laboratory Services, OTC Section

DATE: June, 1979

PROJECT TITLE:
Anchimeric Assistance in Haloform Formation

KEY WORDS: Haloform formation, neighbouring group effects, water chlorination.

PRINCIPLE INVESTIGATOR AND AFFILIATION: O. Meresz

LIAISON OFFICER OR SUPERVISOR: O. Meresz

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

OBJECTIVE:
To obtain information and better understanding of the haloform reaction involving complex natural organic compounds such as humic substances generating trihalomethanes upon chlorination during drinking water treatment.

DESCRIPTION:
The formation of trihalomethanes (THM) from humic substances during drinking water chlorination is a very complex process. Differences between the free and total potential haloform contents of finished drinking waters indicate that more than one type of precursor sites are involved in the haloform reaction. Some of these sites generate trihalomethanes at a very fast rate while others form more stable intermediates that decompose to THM slowly or only on heating. The proposed study is designed to investigate the molecular basis for this behaviour using synthetic model precursor compounds.

DURATION OF PROJECT: 2 YEARS
PRESENT YEAR IS: 1 YEAR
REPORTING DATE: September, 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$4,000	$2,000	0.2	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

LS-38

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services, OTC Section *DATE:* June, 1979

PROJECT TITLE: Development of a Trace Analytical Method for the Determination of Bromide Ions in Water at the Low ppb Range.

KEY WORDS: Bromide ion analysis, water, haloform formation.

PRINCIPLE INVESTIGATOR AND AFFILIATION: E. G. Adamek

LIAISON OFFICER OR SUPERVISOR: O. Meresz

RESEARCH CATEGORY:

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

OBJECTIVE:

To develop a trace analytical method for the determination of bromide ions in water using the haloform reaction and existing routine method and instrumentation for quantitation.

DESCRIPTION:

At the present time, no convenient analytical method exists for the quantitation of bromide below the mg/L levels. This hinders the study of bromide input to the environment through the use of leaded gasoline and the occurrence of bromine containing organohalides in chlorinated drinking waters.

The application of the haloform reaction with suitable substrates will be investigated. Initial bromide will be oxidized to bromine or hypobromous acid which, in turn, will brominate an added reactive haloform precursor. Bromide is then determined as bromodichloromethane by gas chromatography using the direct aqueous injection method and electron capture detector.

DURATION OF PROJECT: 1 YEARS *PRESENT YEAR IS* 1 YEAR *REPORTING DATE:* March, 1980

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$5,000	$5,000	0.2	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

LS-39

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* June 18, 1979

PROJECT TITLE: Evaluation of an Electrolytic BOD system for the Determination of the BOD Rate Constant.

KEY WORDS: BOD_5, K_1 analysis, K-Rate

PRINCIPLE INVESTIGATOR AND AFFILIATION C. Simpson

LIAISON OFFICER OR SUPERVISOR S. Villard

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

OBJECTIVE: To determine the applicability of the E/BOD system for the measurement of:

1. the BOD rate constant (K).
2. Nitrogen Oxygen demand.

DESCRIPTION:

The present method for determining the BOD rate constant is extremely cumbersome. It requires: (i) a very large sample volume (≃ 5L) (ii) a large number of bottles (iii) a large amount of incubator space and (iv) for samples with a high BOD - it requires re-aeration of all bottles at regular intervals. The E/BOD system offers a means of eliminating all these problems.

An intercomparison between the two methods will be conducted on as many samples as time permits. The new method will be rated on factors such as (a) simplicity or ease of operation (b) labour and/or time saving potentialities (c) suitability/adaptability to routine laboratory operations (d) precision and accuracy.

DURATION OF PROJECT 4 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* April, 81

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	7000	Nil		Nil

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

IS A REPORT ANTICIPATED? No (internal only)

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1303 6/76

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LS-40

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section DATE: June 18, 1979

PROJECT TITLE:
The Characterization, Perishability and Preservation of Local Wastewater Samples.

KEY WORDS: Perishability, Preservation, Wastewater

PRINCIPLE INVESTIGATOR AND AFFILIATION: C. Simpson

LIAISON OFFICER OR SUPERVISOR: S. Villard

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

OBJECTIVE:
1. To determine the nature and extent of changes in sample characteristics during transportation and storage.
2. To relate sample perishability to sample source.
3. To develop techniques for preserving wastewater samples during prolonged periods of transportation and storage.

DESCRIPTION:

During the summer and fall of 1975, several cases were investigated where large discrepancies were reported in analytical data produced by the MOE lab and other laboratories. It was found that elapsed time (between sample collection and analysis) and the initial composition of the sample exerted major effects on the accuracy (reliability) of the results obtained at the MOE lab.

Wastewater samples varying widely in composition will be collected from selected W.P.C.P. The samples will be analyzed fresh and at specified intervals over a twenty-one day period. The parameters measured will include BOD_5, TOC, solids and the nutrients. Some of the techniques used for sample preservation will be evaluated.

DURATION OF PROJECT: ——— YEARS PRESENT YEAR IS 2 YEAR REPORTING DATE April, 1980

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
10,000	1000		½ mo.

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

IS A REPORT ANTICIPATED? No (internal only)

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

LS-41

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* June 18, 1979

PROJECT TITLE:

An Analytical Procedure for Organic Carbon in Waters which may or may not contain Suspended Solids

KEY WORDS: Organic carbon analysis, River, Wastewater, suspended solids

PRINCIPLE INVESTIGATOR AND AFFILIATION J. Crowther

LIAISON OFFICER OR SUPERVISOR S. Villard

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

OBJECTIVE:

To develop an analytical procedure for organic carbon in water, wastes and sewage streams as well as assess present systems.

DESCRIPTION:

Although a number of carbon analyzers are available, none are suitable for high volume analyses of particulate carbon, and the reliability of results has not been sufficiently established.

Available equipment will be evaluated with respect to:

a) scope of carbon analyses

b) stability and rate of performance

c) reliability of results

DURATION OF PROJECT 6 *YEARS* *PRESENT YEAR IS* 4 *YEAR* *Completion DATE* April 1, 1981

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	18,000	Nil	36 mo.	Nil

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

IS A REPORT ANTICIPATED? No (internal only)

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

LS-42

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Service Branch, Water Quality Section *DATE:* June 18, 1979

PROJECT TITLE:
Development of Acclimatized BOD "Seeds" for Industrial Wastes

KEY WORDS: BOD_5, Industrial Wastes, Acclimatized Seeds

PRINCIPLE INVESTIGATOR AND AFFILIATION: B. Cheung

LIAISON OFFICER OR SUPERVISOR: S. Villard

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

OBJECTIVE:
To develop BOD "seeds" which have been acclimatized to specific industrial waste streams.

DESCRIPTION:
Normally, BOD_5 is determined on "seeded" industrial wastes, but the "seed" utilized is domestic sewage oriented. It is well established that the bacteria colony required to break down an industrial waste differ significantly from the colony present in domestic sewage, and that the use of a sewage "seed" frequently produces low BOD_5 values if applied to industrial waste. For major field projects we would like to develop "seeds" that are suitable for the specific industrial processes.

The approach to be used will be as follows:

1. Develop liason with the field engineers so that supplies of fresh (<1 week in age) industrial effluents are always available.
2. Arrange with Research Branch to provide the laboratory daily with a supply of primary effluent and mixed liquor from Brampton.
3. Develop and maintain "seed" for selected industry. Collect supporting analytical data.
4. Compare BOD data based on acclimatized "seed" to that obtained using sewage "seed".

DURATION OF PROJECT: 4 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE:* April, 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	4600	2000	5 mo.	1 mo.

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

IS A REPORT ANTICIPATED?
No (internal only)

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:
The services of an Experience '78 student were utilized for part of this project; his contributions will be documented in a separate report.

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Ontario

LS-43

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* June 18, 1979

PROJECT TITLE:
Phenols: Recovery and Efficiency of Existing 4-AAP Method

KEY WORDS: Phenols, Recovery of 4-AAP Method for Phenols

PRINCIPLE INVESTIGATOR AND AFFILIATION: F. P. Dieken

LIAISON OFFICER OR SUPERVISOR: S. Villard

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

OBJECTIVE:
A recovery study of various phenols by our present 4-AAP method

DESCRIPTION:
Various authors report different recoveries with 4-AAP methods for phenolics. Our method requires documentation of recoveries.

Various phenolics will be collected and analyzed using our present method. Special emphasis will be placed on chlorophenols since they may contribute to taste and odour problems.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	3500	Nil	3 mo.	Nil

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

IS A REPORT ANTICIPATED? No (internal only)

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* June 18, 1979

PROJECT TITLE:

Arsenic interference in the determination of Phosphorous

KEY WORDS:

PRINCIPLE INVESTIGATOR AND AFFILIATION F.P. Dieken

LIAISON OFFICER OR SUPERVISOR S. Villard

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

OBJECTIVE:

To determine the extent of arsenic interference in our phosphorus tests. Also to eliminate interference effects if found to be a significant contribution to our analytical results.

DESCRIPTION:

Arsenic should be an interference in the soluble reactive phosphorus test but not in the total phosphorus test. The filtered total phosphorus test may or may not suffer from an interference effect. The elimination of the interference will also be studied.

Analysis of solutions with/without arsenic will be undertaken. The extent of the interference will be determined and if significant, complexing agents for arsenic will be examined to try to eliminate any positive interference.

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*
	3000	2000	6 mo.	1 mo.

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

IS A REPORT ANTICIPATED? No (internal only)

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

LS-45

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section DATE: June 18, 1979

PROJECT TITLE:
Investigation of Flow Injection Analysis (FIA) Systems and Methods

KEY WORDS: Flow Injection Analysis

PRINCIPLE INVESTIGATOR AND AFFILIATION: F.P. Dieken

LIAISON OFFICER OR SUPERVISOR: S. Villard

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

OBJECTIVE:
To evaluate Flow Injection Analysis Methods and define their potential use in the Water Quality Section.

DESCRIPTION:

FIA methods are reputed to be up to 40 times faster than normal segmented stream analytical methods used on Technicon Colorimetric methods. A variety of detectors are also available for Colorimetric, potentiometric, conductiometric and spectrophotometric analyses.

The approach will be to test theoretical principles and instrumentation available (very limited supply available) and use existing colorimetric methods to confirm speed of analysis and determine variables associated with adopting this new technique for routine testing.

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS: 2 YEAR — REPORTING DATE: November, 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	10,000	9000	5 mo.	4 mo.

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

IS A REPORT ANTICIPATED? No (internal only)

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY LS-46

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* June 18, 1979

PROJECT TITLE:
Evaluation of Existing Analytical Methods as Applied to Process Waters and Industrial Effluents

KEY WORDS: Analysis, Industrial Effluents, Process Waters, Sewage, Validity

PRINCIPLE INVESTIGATOR AND AFFILIATION J. Crowther

LIAISON OFFICER OR SUPERVISOR S. Villard

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

OBJECTIVE:

To establish the validity of current analytical techniques when applied to problem sewage samples and industrial effluents.

DESCRIPTION:

Most of our analytical techniques were developed for surface waters, but we apply them to process waters with only minor alterations. We would like to establish the validity of these analyses, and identify problem areas.

The approach to be taken is as follows:

1) Establish a file of analytical data for various industries
2) Dilute and spike routine problem samples
3) Run interference studies

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	4500	1000		½ mo.

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

IS A REPORT ANTICIPATED? No (internal only)

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

LS-47

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* June 18, 1979

PROJECT TITLE:
Fluoride Analyses in Waters

KEY WORDS:
Fluoride, Analyses, Water

PRINCIPLE INVESTIGATOR AND AFFILIATION M. W. Rawlings

LIAISON OFFICER OR SUPERVISOR S. Villard

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

OBJECTIVE:

To determine the applicability of the fluoride specific ion electrode as used in the field, by comparison with two other analytical procedures.

DESCRIPTION:

The fluoride specific ion electrode has gained widespread use in the field and small laboratories.

Fluoride was analyzed by three procedures and the results evaluated:

a) Specific ion electrode

b) Alizarin Red manual procedure

c) Alizarin Blue automated procedure

DURATION OF PROJECT 5 *YEARS* *PRESENT YEAR IS* 5 *YEAR* *REPORTING DATE* March, 1980

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	12,000	1000	12 mo.	½ mo.

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

IS A REPORT ANTICIPATED? No (internal only)

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

LS-48

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* June 18, 1979

PROJECT TITLE:
Chlorinated Species Measured by the Amperometric Titrator

KEY WORDS:

PRINCIPLE INVESTIGATOR AND AFFILIATION S. Wisz

LIAISON OFFICER OR SUPERVISOR S. Villard

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

OBJECTIVE:

To determine which chlorinated species are measured by the amperometric titration technique.

DESCRIPTION:

The amperometric titration procedure is considered to be the most precise method available for measuring residual chlorine. No attempt has been made to establish which chlorinated species, inorganic or organic, are measured by this technique.

DURATION OF PROJECT 4 *YEARS* *PRESENT YEAR IS* 3 *YEAR* *REPORTING DATE* ~~November, 1980~~

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	6000	Nil	4 mo.	Nil

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

IS A REPORT ANTICIPATED? No (internal only)

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

LS-49

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section DATE: June 18, 1979

PROJECT TITLE:
An In-Depth Review of the Entire Chlorophyll Procedure

KEY WORDS: Chlorophyll

PRINCIPLE INVESTIGATOR AND AFFILIATION: F.P. Dieken

LIAISON OFFICER OR SUPERVISOR: S. Villard

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

OBJECTIVE:
To determine precision limiting steps in the existing procedure to improve the throughput time by examining alternative maceration procedures. To investigate alternative analytical methods and preservation techniques.

DESCRIPTION:
The present procedure is not very precise. Acidification to obtain corrected Chlorophyll a often provides anomolous results. The procedure presently being used is time consuming with some problems observable. The effect of the preservation and/or natural turbidity of filtered extracts on analytical results needs to be investigated.

A technician is being designated to examine the entire test procedure. New maceration techniques will be investigated. Preservation techniques will be examined to clarify the amount of $MgCO^3$ necessary for preservation and its effect on chlorophyll and acidified chlorophyll results.

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS: 2 YEAR — REPORTING DATE: November 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	12,000	6000	6 mo.	3 mo.

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-50

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section DATE: June 18, 1979

PROJECT TITLE:
Determination of Bromide by Ion Chromatography

KEY WORDS: Bromide, ion chromatography, precipitation

PRINCIPLE INVESTIGATOR AND AFFILIATION: J. Crowther

LIAISON OFFICER OR SUPERVISOR: S. Villard

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

OBJECTIVE:
To determine bromide at ppb levels in precipitation samples.

DESCRIPTION:

Bromide is normally present in automobile exhausts and should serve as a tracer for this type of man-made pollution. Bromide will be determined in aqueous samples by ion chromatography after having pretreated the samples to reduce interferences such as nitrate which may also be present.

DURATION OF PROJECT: 2 YEARS | PRESENT YEAR IS: 1 YEAR | REPORTING DATE: July, 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	10,000	10,000	5 mo.	5 mo.

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

IS A REPORT ANTICIPATED? No (internal only)

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

LS-51

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* June 18, 1979

PROJECT TITLE:

Low Level Cation Analysis by Ion Chromatography

KEY WORDS:

Cation, ion chromatography, precipitation

PRINCIPLE INVESTIGATOR AND AFFILIATION J. Crowther

LIAISON OFFICER OR SUPERVISOR S. Villard

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

OBJECTIVE:

To determine sodium, potassium, ammonium, calcium and magnesium at parts per billion levels utilizing one or two ion chromatographic systems.

DESCRIPTION:

Cation concentrations in precipitation samples range from less than 1 to 1000 ppb. A system capable of determining the basic cations simultaneously with the anions is desirable. Ion chromatography should provide the capability.

The approach will be to first develop two cation systems using Dionex instrumentation; one for monovalent cations, the other for divalent cations. Secondly, the possibility of developing one system capable of handling five cations (sodium, potassium, ammonium, calcium and magnesium) will be investigated.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* June, 1980

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	10,000	7500	5 mo.	4 mo.

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

IS A REPORT ANTICIPATED? No (internal only)

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-52

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* June 18, 1979

PROJECT TITLE:

Digital Titrator: TRS-80 Implementation

KEY WORDS: Computerized titration system; low level alkalinity/acidity; acid precipitation analysis; precipitation analysis.

PRINCIPLE INVESTIGATOR AND AFFILIATION M. W. Rawlings

LIAISON OFFICER OR SUPERVISOR B. Stundzia

RESEARCH CATEGORY:

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

OBJECTIVE:

To interface a Radio Shack TRS-80 microcomputer to a Radiometer Autoburette and pH meter providing reading and control functions; to develop software to operate the system as a differentially controlled titration system with suitable data output.

DESCRIPTION:

Accurate analysis of low buffer systems for alkalinity or acidity requires examination of the titration curve for inflection points. Commercial equipment to do this type of analysis is prohibitively expensive and only moderately successful. Since alkalinity and acidity will be key measurements in evaluation of effects of acid precipitation on Ontario lakes, suitable instrumentation must be custom tailored by our staff.

Radiometer equipment has been proven to be capable of the required performance. The TRS-80 microcomputer with Level II Basic has the necessary computing power. A custom interface to allow the TRS-80 to control the auto-burette and obtain required readings will be designed, built, and proven. Software of the type used on the current Hewlett-Packard implementation will be developed and proven.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	4000	4000	2 mo.	2 mo.

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:* June 29, 1979

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 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 continue an examination of pesticides synthesized from substituted anilines to determine the extent of their contamination with azobenzenes and other compounds.
(2) To determine the main factors in soil and other ecosystems which influence the microbial and chemical transformations of substituted aniline and substituted nitrobenzene residues.
(3) To determine the persistence of azobenzenes, bis-triazenes, etc. which are biologically produced in soil.

DESCRIPTION: (1) Only a single compound, tetrachloroazobenzene, is produced in soil under aerobic conditions. Soil studies will be expanded to include possible transformations of both anilines and nitrobenzenes under reducing conditions in soil and other ecosystems which have the characteristic environmental conditions to favour these microbial transformations.

(2) Studies will continue in the mechanisms of formation of the dichloro- and trichlorobiphenyls from 3,4-dichloroaniline. Studies last year showed that two isomers of tetrachlorobiphenyl were formed from 3,4-dichloroaniline and experiments are in progress to determine the structures of these isomers as an aid in this study.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress report Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$11,600	$6,600		

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

IS A REPORT ANTICIPATED? Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* June 29, 1979

PROJECT TITLE: Bacterial speck control for tomato

KEY WORDS: bacterial speck tomato copper

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. L. V. Edgington
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:

(1) Evaluate bactericide(s) for efficacy against bacterial speck in the laboratory, a controlled environment and in the field.

(2) Determine the duration of efficacy and the minimal amount necessary to control disease.

(3) Reduce the amount of copper currently used on tomatoes.

DESCRIPTION:

Bacterial speck caused by Pseudomonas tomato has become more and more serious in Ontario's 21,000 acres of tomatoes. This is apparently because of several reasons: (1) tomatoes are transplanted into the field about 10 days earlier to extend the processing season thus "stressing" plants with colder temperatures; (2) new determinant type of plants bred for machine harvesting are more seriously affected; and (3) crop rotation is very difficult because land values are so high and few suitable high value crops are available for rotation.

Currently the growers are applying 16 to 20 lbs/acre (18 to 22 kg/ha) per season. This is considered to be too much copper and since it is a biocide, will likely cause undesirable effects if continued.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress report Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$6,500	$6,500		

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

IS A REPORT ANTICIPATED? Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* June 29, 1979

PROJECT TITLE:
The economic significance of potato leafhoppers in new seedings of alfalfa

KEY WORDS: potato leafhopper 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:
(1) Determine the effect of leafhoppers on the yield of alfalfa the first year after planting.
(2) Determine the effect of leafhoppers on protein content the first year after planting.
(3) Determine whether leafhoppers the year of planting cause yield reduction the following year either by reducing the plant stand, the dry weight or protein content.
(4) Determine from the above the dollar loss caused by leafhoppers to new seedings in Ontario and thereby determine the economic threshold.

DESCRIPTION:

The Problem: There are no Ontario data on the economic losses caused by the potato leafhopper on alfalfa. Specifically, information is needed on the effect of leafhoppers on quantity (dry weight) and quality (protein) the year of attack and on winter survival and production the following year. Only with such data can we determine the importance of leafhoppers on alfalfa in Ontario and determine under what circumstances insecticide should be applied.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress report Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$20,300	$10,400		

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

IS A REPORT ANTICIPATED?
Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PAC - 4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* June 29, 1979

PROJECT TITLE: Fate of mercurial fungicides used to control disease in turfgrass

KEY WORDS: mercurial fungicides turfgrass disease

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. S. G. Fushtey
Dept. of Environmental Biology

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 continue to assemble efficacy data on promising new fungicides with a view to facilitating registration of materials for use in controlling the snow mold disease in fine turfgrass.
(2) To determine what happens to mercurial fungicides applied to turfgrass for disease control, with a view to determining the significance of this practise as a factor in environmental pollution.

DESCRIPTION:

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress report Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$11,800	$7,800		

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

IS A REPORT ANTICIPATED? Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PAC - 5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* June 29, 1979

PROJECT TITLE: Control of mosquito eggs, larvae and pupae in catch basins in Ontario with a local Planarian flatworm, Dugesia tigrina

KEY WORDS: mosquitoes catch basins Planarian flatworm

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. J. A. George
Dept. of Zoology, 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:

DESCRIPTION:

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress report Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$5,800	$5,800		

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

IS A REPORT ANTICIPATED? Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PAC - 6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* June 29, 1979

PROJECT TITLE: Effects of insect growth regulators and of microencapsulated larvicidal agents on emergence of blackfly larvae and on non-target aquatic invertebrates

KEY WORDS: insect growth regulators, microencapsulated larvicidal agents blackfly 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 —— *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT ——
CONCURRENT PROJECT ——

OBJECTIVE:

To study the effects of insect growth regulators (methoprene, diflubenzuron) and microencapsulated formulations of chlorpyrifos-methyl on blackfly larvae and associated non-target organisms.

DESCRIPTION:

a) Determine the effects of the compounds on target species like Simulium vittatum, S. venustum and Prosimulium mixtum.

b) Determine the susceptibility of different instars to the compounds.

c) Evaluate 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 3 *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* Progress report Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$23,200	$8,000		

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

IS A REPORT ANTICIPATED? Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* June 29, 1979

PROJECT TITLE:
Insecticidal baits for control of the European earwig

KEY WORDS: insecticidal baits European earwig

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 an effective bait for control of the European earwig.

DESCRIPTION:

The European earwig is present in many parts of Ontario and can be a major nuisance.

The main problem with earwigs is that they enter houses and will be found crawling about, especially at night. This is disturbing to some home occupants and they may go to extreme measures to try to eliminate the pests.

The European earwig will be cultured in the laboratory in sufficient numbers to permit the testing of a large number of insecticides as possible toxicants in baits. The procedure will be to:

1. Develop a bait attractive to the earwigs
2. Add insecticides to the bait at 1000, 5000 and 10,000 ppm and test:
   a. attractancy of the bait
   b. toxicity to the earwigs

When a satisfactory toxic bait has been developed, it will be tested in some problem areas.

The biology of the earwig will be investigated as a part of the program.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress report Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$6,400	$6,400		

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

IS A REPORT ANTICIPATED? Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* June 29, 1979

PROJECT TITLE:
Diquat and other aquatic herbicides in aquatic systems

KEY WORDS: Diquat aquatic systems sediments

PRINCIPLE INVESTIGATOR AND AFFILIATION
Dr. C. I. Mayfield
Department 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:
The objectives for 1979-80 are:

1. To complete the work with diquat in the laboratory systems and to complete the studies on rates of transfer from sediment to water and vice versa. Movement of diquat within the sediment will also be measured.
2. To measure the effects of sediment resuspension on the release of diquat in aquatic systems.
3. To test the results of all laboratory experiments on small scale field trials.
4. To produce a computer model of these field experiments and compare it to that produced for the laboratory experiments.
5. To carry out a pilot project with another aquatic herbicide in field trials and test the validity of the more complicated model with such trials.

DURATION OF PROJECT 2 *YEARS* — *PRESENT YEAR IS* 2nd *YEAR* — *REPORTING DATE* Progress report Dec. 1979

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$14,000	$6,800		

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

IS A REPORT ANTICIPATED?
Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* June 29, 1979

PROJECT TITLE:
The Ecology of the Subterranean Termite, Reticulitermes flavipes in Southern Ontario

KEY WORDS: Subterranean termite Southern Ontario

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. D. H. Pegelly
Department 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:

The details of the life cycle of the species in Ontario will be studied to determine what stage would be most vulnerable to control measures. Studies will include further work on the location of colonies, the structure of established colonies, methods of dispersal and the establishment of new colonies. In so far as possible, the present distribution will be investigated as well as the predators, parasites and pathogens.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress report Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$14,900	$7,400		

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

IS A REPORT ANTICIPATED? Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* June 29, 1979

PROJECT TITLE:
An Economic Assessment of the Costs and Potential Benefits of Pest Monitoring for Onion Crops in Ontario

KEY WORDS:
Economic Assessment Pest Monitoring Onions

PRINCIPLE INVESTIGATOR AND AFFILIATION
Dr. W. C. Pfeiffer
School of Agricultural Economics, 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:
Identify the extent of the monitoring required to bring about an effective management system for these crops.

Determine the net economic consequences to growers through the cost of changes associated with reduced chemical usage.

Suggest alternative means and levels of pest control and estimate their costs and benefits for comparison with those methods now in use.

DESCRIPTION:

There are now several areas in Ontario where pest management, primarily through pest monitoring, is carried out to some extent. It appears that this saves pesticides, saves money and is accepted by the growers, but there is little in the way of good data to support these conclusions. It should be possible through grower interviews and input from researchers to determine 'How much is monitoring going to cost?' and "What will be the potential economic benefits of the pest management program it fosters?".

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress report Dec. 1979

BUDGET:

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

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

IS A REPORT ANTICIPATED? Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* June 29, 1979

PROJECT TITLE:
Determination of the economic threshold of insect populations on apple trees by photosynthesis

KEY WORDS: economic threshold insects apples photosynthesis

PRINCIPLE INVESTIGATOR AND AFFILIATION
Dr. J. T. A. Proctor
Dept. of Horticultural Science, 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 economic threshold for the spotted tentiform leaf miner on apple trees.

DESCRIPTION:

Insects damage leaf tissue which can be deleterious to growth and fruiting of economically important tree fruits. This damage may cause restrictions in fruit tree growth and leaf chlorophyll, impair nutrient balance, reduce flower bud formation and fruit size, and cause poor fruit finish. However, the level of insect injury that can be tolerated before economic losses of quality or yield of fruit is not known with certainty.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress report Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$8,000	$8,000		

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

IS A REPORT ANTICIPATED? Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL BRANCH *DATE:* June 29, 1979

PROJECT TITLE:
The biology and control of mosquitoes and other biting flies in Ontario

KEY WORDS: biology and control mosquitoes biting flies

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 asses the 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 quidelines 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* 4th *YEAR* *REPORTING DATE* Progress report Dec. 1979

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? Report prepared annually by O.P.A.C.

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 BRANCH *DATE:* June 29, 1979

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 aslo 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 Thedford 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* 2nd *YEAR* *REPORTING DATE* Progress report Dec. 1979

BUDGET:

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

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

IS A REPORT ANTICIPATED? Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL DATE: June 29, 1979

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 (0.405 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 2 YEARS PRESENT YEAR IS 2nd YEAR REPORTING DATE Progress report Dec. 1979

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
$14,500	$7,500		

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

IS A REPORT ANTICIPATED? Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* June 29, 1979

PROJECT TITLE:
A study of the production of fungal bait blocks for the attraction of termites

KEY WORDS: termites fungal bait blocks

PRINCIPLE INVESTIGATOR AND AFFILIATION
Mr. R. E. Smith
Department of Microbiology, 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 improve the rate of wood decay and growth of Gloeophyllum trabeum, presently used for bait block production, in an attempt to reduce the time required.
To improve yields of the fungal product responsible for attracting termites.
To search for more effective fungal species.
To investigate alternate materials for the production of fungal baits.

DESCRIPTION:

For the past 10 years, Esenther, Gray and others have been using wooden blocks partially decayed by certain brown rot fungi as baits for termites. These blocks have been found to attract subterranean species of the insect when buried in soil, because the fungus produces a compound(s) resembling the trail-following pheromone secreted by certain termites. This phenomenon has been used to sample various sites for the presence of termite colonies. Recently, studies have been made in which such blocks are impregnated with insecticides, in the hope that the chemicals will be carried by the insects to their colonies.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress report Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$5,900	$5,900		

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

IS A REPORT ANTICIPATED? Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

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RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* June 29, 1979

PROJECT TITLE:
Feasibility of using the litterbag technique as an index of the environmental impact of soil insecticides on the soil fauna

KEY WORDS: soil insecticides soil fauna litterbag technique

PRINCIPLE INVESTIGATOR AND AFFILIATION
Dr. A. D. Tomlin
Dept. of Zoology, 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 studies of decomposition rates have been established in a corn-field under carbofuran-treated (at normal rates) and untreated conditions. We have also investigated litter decomposition rates in a pasture, an old apple orchard and a deciduous wood. Several dozen bags from 1978 are still buried and remain to be analyzed during the spring and early summer of 1979. We therefore propose to study in 1979:

a) The balance of the litterbags buried in 1978 in all 4 systems (pasture, corn field, deciduous wood and orchard.)

b) Determine the effect of high carbofuran application in the form of row and broadcast treatments. This would achieve three purposes: (i) a definitive comparison of row and broadcast treatments on non-target organisms, (ii) the effect of a high insecticide dose on the litter decomposition process; and (iii) how long it takes for the soil to return to stable conditions.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* Progress report Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$25,000	$6,000		

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

IS A REPORT ANTICIPATED? Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL

DATE: June 29, 1979

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
Dept. of Biochemistry, 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 determine if, and to what extent, pyrethroid insecticides are degraded by soil micro-organisms.

DESCRIPTION:

During 1978 techniques for extraction and analysis of the pyrethroids were perfected and the soil samples treated, incubated, and extracted. Microbiological studies to assess numbers and types of organisms in the soil were completed. The number of insecticides tested (7), numerous sampling intervals, and complex analysis for isomers resulted in a very large number of samples, many of which have not yet been analyzed. These analyses will be completed over the next six months.

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS: 3rd YEAR — REPORTING DATE: Progress report Dec. 1979

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
$22,000	$6,000		

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

IS A REPORT ANTICIPATED?
Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

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RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* June 29,1979

PROJECT TITLE:
Effects of companion planting on pests in the home garden

KEY WORDS: home garden pests companion planting

PRINCIPLE INVESTIGATOR AND AFFILIATION
Mr. R. T. Wukasch
Dept. of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR
Ontario Pesticides Advisory Committee

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

OBJECTIVE:
1) Test methods of companion planting for control of insect pests and plant disease on selected, homegarden vegetables and ornamentals.

2) Develop and publish recommendations for agricultural extension workers and homegardeners regarding the efficacy of companion planting in pest and disease control.

DESCRIPTION:

An increasing number of homegardeners are requesting alternatives to pesticides for controlling pests. This phenomenon is due, in part, to public concern over pesticide use, to the "back to nature" and "organic" gardening movements, to an expanding interest in gardening, and to the limited availability and expensive cost of pesticides.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress report Dec. 1979

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?
Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* June 29, 1979

PROJECT TITLE:
A study of the residual life of commonly used insecticides in structural pest control

KEY WORDS: structural pest control residual life

PRINCIPLE INVESTIGATOR AND AFFILIATION
Mr. R. W. Cameron
P.C.O. Services, Toronto

LIAISON OFFICER OR SUPERVISOR
Ontario Pesticides Advisory Committee

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

OBJECTIVE:
Investigate the effect of varying conditions on the residual life of some commonly used insecticides. This will involve treating various types of surfaces with selected insecticides and monitoring their residual life.

DESCRIPTION:

In structual pest control, residual insecticides are applied to many types of surfaces, under varying conditions of temperature and humidity and at different time intervals. As well, several types of diluents are commonly used.

The question often arises as to the residual life of the chemicals under these varying conditions. The answer to this has a direct bearing on the degree of control achieved and the amount of residues left within a premise.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress report Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$6,000	$6,000		

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

IS A REPORT ANTICIPATED? Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

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RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* June 29, 1979

PROJECT TITLE:
The behavioral effects of sublethal doses of aquatic herbicides on the rheotropic responses of rainbow trout (Salmo gairdneri)

KEY WORDS: aquatic herbicides sublethal doses Rainbow trout

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. C. I. Mayfield and 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 tissue; 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 3 *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* Progress report Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$26,900	$12,000		

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

IS A REPORT ANTICIPATED? Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

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RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* June 29, 1979

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 4 *YEARS* *PRESENT YEAR IS* 4th *YEAR* *REPORTING DATE* Progress report Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$49,000	$14,000		

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

IS A REPORT ANTICIPATED?
Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

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RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL BRANCH *DATE:* June 29, 1979

PROJECT TITLE:
A feasibility study on pest monitoring for pests of carrots and onions

KEY WORDS: pest monitoring insects plant diseases

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 determine the feasibility of implementing a pest monitoring program for insect pests and diseases of carrots and onions in the Holland-Bradford Marshes.

DESCRIPTION:

Pest monitoring has been shown to be effective as a guide to treatment dates for pest control, with the result that needless treatments are avoided and pesticide use reduced. The best researched area for using this procedure has been in orchard pest control.

In the intensive vegetable growing muck areas of Ontario, monitoring has been carried out on some of the pests of onions and carrots. Guided by this monitoring, advice has been given to some growers with respect for the need to treat for some specific pests. The program has not been researched adequately to be put in place with the kind of integration of data needed to ensure confidence of growers and maximum pesticide savings.

DURATION OF PROJECT: 1 YEARS *PRESENT YEAR IS:* 1st YEAR *REPORTING DATE:* Progress report Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$51,000	$51,000		

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

IS A REPORT ANTICIPATED?
Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* June 29, 1979

PROJECT TITLE:
The cause and control of bacterial speck in Ontario tomatoes

KEY WORDS: tomatoes bacterial speck causes and control

PRINCIPLE INVESTIGATOR AND AFFILIATION:
Dr. B. H. MacNeill
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:
Develop a series of diagnostic laboratory tests which will facilitate the identification of the causal agent of speck.

Locate the primary sources of the causal agent whether it be the seed, the soil of the seed bed, or other plants and weeds in the cropping system.

DESCRIPTION:

The proposal is concerned with the identification of the causal agent of bacterial speck and its various pathogenic strains together with a study of those management practices which would lead to an improvement in control; special emphasis will be placed on genetic resistance.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress report Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$6,500	$6,500		

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

IS A REPORT ANTICIPATED?
Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* August, 1979

PROJECT TITLE:
Blackbird population management on high crop damage areas

KEY WORDS:
Blackbirds population management crops

PRINCIPLE INVESTIGATOR AND AFFILIATION
Dr. F. F. Gilbert
Dept. of Zoology, University of Guelph

LIAISON OFFICER OR SUPERVISOR
Ontario Pesticides Advisory Committee

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

OBJECTIVE:
To find a means whereby crop damage resulting from the foraging of blackbirds may be reduced.

DESCRIPTION:
Since the inception of the vertebrate pest control research program in 1976, the Zoology Department has directed its efforts toward the development of an economically and ecologically sound management scheme for the control of depredating re-winged blackbirds (Agelaius phoeniceus) in Ontario.

Information obtained during 1977 and 1978 indicated that no single existing control measure can solve the problem of depredating blackbirds in corn, and probably other agricultural crops. In certain areas of the province, population control (i.e. reduction) may have to be incorporated into a management scheme before significant economic benefit is realized.

DURATION OF PROJECT 5 *YEARS* *PRESENT YEAR IS* 4 *YEAR* *REPORTING DATE* Progress report December 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$201,000*	$31,000		

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

IS A REPORT ANTICIPATED?
Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:
*Supervision of this project was transferred to the Pesticides Advisory Committee in 1978.

Ministry of the Environment
Ontario

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RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* August, 1979

PROJECT TITLE:

Assessment of three chemicals as control agents for bats.

KEY WORDS:

bats, chemical control, DDT, zinc phosphide, fenthion

PRINCIPLE INVESTIGATOR AND AFFILIATION

Dr. M. B. Fenton, Dept. of Biology
Carleton University, 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 three chemicals as possible toxicants for bat control, and to test the usefulness of an auditory repellent (designed for use against mice) against bats.

DESCRIPTION:

Initial testing of different concentrations of the three chemicals will be conducted using small roost boxes constructed of wood (the general setting in which most bats occur in houses). We will use three bats for each of five concentrations of each of the three chemicals. The bats will be confined in the small roosts with the chemicals and observed to determine the effects of the latter.

To consider the general effectiveness of the three chemicals in controlling bats, we will construct larger, two-chambered bat roosts, apply an appropriate concentration of the toxicants to one of the chambers, and observe the bats. This design will permit us to assess the immediate effects of the pesticides on the animals, and to determine whether or not the bats will attempt to leave the contaminated areas. In this part of the experiment we will use 10 adult female, and 5 subadult males and 5 subadult female little brown bats (Myotis lucifugus). The control roost will contain no pesticide.

DURATION OF PROJECT 1 ——— *YEARS* *PRESENT YEAR IS* 1 ——— *YEAR* *REPORTING DATE* Progress Report Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$1,875	$1,875		

SOURCE OF FUNDS:

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

IS A REPORT ANTICIPATED?

Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PAC - 26

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* August, 1979

PROJECT TITLE: To compare herbicide application methods using three new spray designs.

KEY WORDS: herbicides application methods

PRINCIPLE INVESTIGATOR AND AFFILIATION: R. H. Brown, Ridgetown College of Agricultural Technology and Ontario Vegetable Growers' Marketing Board

LIAISON OFFICER OR SUPERVISOR: Ontario Pesticides Advisory Committee

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

OBJECTIVE:

Compare the application of herbicides with three new sprayer designs to determine their effectiveness, crop sensitivity, crop coverage and/or target organisms and drift on non-target deposition.

DESCRIPTION:

1. Roll-on sprayer
2. Recirculating sprayer
3. Wick-sprayer
4. Conventional boom type sprayers (control)

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* Progress Report Dec. 1979

BUDGET:

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

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

IS A REPORT ANTICIPATED? Report prepared annually by O.P.A.C.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* July 30, 1979

PROJECT TITLE: The Effect of Hydraulic Characteristics and Effluent Chlorination on the Incidence of Microorganisms of Public Health Significance in Receiving Waters.

KEY WORDS: Chlorination, pathogens, bacteria, effluent plume, sewage, receiving waters, hydraulic dispersion.

PRINCIPLE INVESTIGATOR AND AFFILIATION
Beak Consultants Ltd.
Beak Division of Sandwell & Company

LIAISON OFFICER OR SUPERVISOR
Ann H. Vajdic

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

OBJECTIVE:

To determine if chlorinated sewage effluents result in significantly lower numbers of organisms of public health significance in receiving waters as compared to unchlorinated effluents.

DESCRIPTION:

Hydraulic, water quality and atmospheric conditions which contribute to the die-off of pathogenic bacteria in chlorinated and non-chlorinated sewage effluents and their receiving streams, will be investigated.

Four sewage treatment plants and their receiving waters (3 rivers and 1 lake) will be investigated. All significant factors which influence bacterial growth and mortality in the receiving waters will be studied.

A sound basis for the development of guidelines and criteria for sewage effluent disinfection will be obtained.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	260,684.00	141,896.00		

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 79-028-13

Ministry of the Environment
Ontario

PC-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* July 30, 1979

PROJECT TITLE: Ozone as an Alternative to Chlorination for Drinking Water Disinfection

KEY WORDS: Ozone, Disinfection, Drinking Water

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. K. L. Murphy
IEC (International Engineering Consultants)

LIAISON OFFICER OR SUPERVISOR A. Oda

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

OBJECTIVE:
To examine the use of ozone as an alternate disinfectant for drinking water and to investigate possible by-products of ozone and/or chlorination and study relative mutagenicity.

DESCRIPTION:
Study will examine differing raw waters (turbidity, coloured, Great Lakes) and the by-products produced by the various processes of ozonation, ozonation/chlorination and ozonation/chloramination. The principal by-products will be concentrated and subjected to Ames' testing to examine relative mutagenicity.

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

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	209,000	110,000		

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

IS A REPORT ANTICIPATED? Yes - MOE Lottery report; interim quaterly reports will be available.

PARTICIPATION BY OTHER MINISTRIES: ---

REMARKS: Provincial Lottery project #79-027-13

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* July 30, 1979

PROJECT TITLE:

Chloroform Reduction Investigation Program at Belleville Utilities Commission

KEY WORDS: Disinfection, Drinking Water, Chloroform

PRINCIPLE INVESTIGATOR AND AFFILIATION Belleville Utilities Commission, Belleville, Ontario with sub-contract to Gore & Storrie Ltd. Toronto, Ontario.

LIAISON OFFICER OR SUPERVISOR K. Roberts

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 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* 2 *YEAR* *REPORTING DATE* Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	84,000	31,000	0.2	0.1

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

S A REPORT ANTICIPATED? Yes - interim reports are available

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Man years indicate the minimum level of Water Technology Section participation.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: July 30, 1979

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: Brantford Public Utilities Commission
Sub-contractor J.F. MacLaren Ltd., 'Enviroclean'

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 appliable 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	-	0.3	

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

IS A REPORT ANTICIPATED? Yes - MOE Lottery report - interim reports available.

PARTICIPATION BY OTHER MINISTRIES:
-

REMARKS:

Man years indicated are minimum level of input to project by Water Technology staff.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

PC-5

BRANCH: Pollution Control

DATE: July 30, 1979

PROJECT TITLE: Distribution System Survey

KEY WORDS: Potable water, quality, distribution system

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

LIAISON OFFICER OR SUPERVISOR: K. Roberts

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

OBJECTIVE:
To 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:* Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	65,000	1,000	3	0.042

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

IS A REPORT ANTICIPATED? Yes - Moe Green bound. See below.

PARTICIPATION BY OTHER MINISTRIES: ---

REMARKS:
A preliminary data analysis was presented to Ontario Section AWWA annual meeting May 1978. Final Green cover MOE report should be finalized December 1979.

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* July 30, 1979

PROJECT TITLE: Comparison of pre-chlorination versus post chlorination on full scale plant testing

KEY WORDS: Potable water, pre(post)-chlorination, chlorinated organics

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

LIAISON OFFICER OR SUPERVISOR: K. Roberts

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

OBJECTIVE:

To compare pre-and post-chlorination as the two processes affect the treatment operation and to monitor chlorinated organic production during the two modes of full scale plant operation.

DESCRIPTION:

Sample collection and analysis for organic chemical (particularly haloforms), bacteriological and virus will be carried out during phases, on a full plant scale, of pre-chlorination and post chlorination alone. Results will be compared with the normal pre-and post-chlorination mode of operation.

DURATION OF PROJECT: 0.5 YEARS *PRESENT YEAR IS:* 1st YEAR *REPORTING DATE:* Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	10000	10000	0.5	0.5

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

IS A REPORT ANTICIPATED? Yes - MOE Green bound cover

PARTICIPATION BY OTHER MINISTRIES:

Ministry of Health - virus work

REMARKS: Study done in conjunction with Metropolitan Toronto Water Supply.

Ministry of the Environment
Ontario

PC-7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: July 30, 1979

PROJECT TITLE: Trace Organics in Potable Water Supplies

KEY WORDS: Organics, potable water

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

LIAISON OFFICER OR SUPERVISOR K. Roberts

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

OBJECTIVE:

To survey and monitor trace organics in raw and treated potable water.

DESCRIPTION:

Samples from water treatment plants throughout the province will be examined for trace organics, particularly those chlorinated organics produced during treatment. The various treatments will be correlated with the occurrence of trace organic contaminants in the finished water.

DURATION OF PROJECT —— *YEARS* *PRESENT YEAR IS* 3 —— *YEAR* *REPORTING DATE* mid 1980

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CUPRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		10000		0.5

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

IS A REPORT ANTICIPATED? Yes - MOE Green bound

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Essentially an on-going project following the burgeoning analytical determinations of trace contaminants in water.

Ministry of the Environment
Ontario

PC-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* July 30, 1979

PROJECT TITLE: Distribution System - Small Animal Survey

KEY WORDS: Protozoa, distribution system

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 the occurrence and magnitude and removal methods of 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 3 *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* mid - 1980

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	23,000	4,500	1.7	0.2

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

IS A REPORT ANTICIPATED? Yes - MOE Green Cover

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PC-9

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* July 30, 1979

PROJECT TITLE: Trace Contaminants in Water Treatment Plant Chemicals

KEY WORDS: Trace contaminants, chemicals

PRINCIPLE INVESTIGATOR AND AFFILIATION D. Wemyss - Water Technology Section

LIAISON OFFICER OR SUPERVISOR K. Roberts

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

OBJECTIVE:

To examine chemicals used in the potable water treatment process, by both physical and chemical analytical methods, for trace contaminants.

DESCRIPTION:

Water treatment plant chemicals will be sampled and subjected so chemical and physical analyses for constituents with special emphasis being placed on trace contaminants.

In addition raw chemicals and production processes at the manufacturing level will be examined.

DURATION OF PROJECT 1.5 ——— *YEARS* *PRESENT YEAR IS* 1st ——— *YEAR* *REPORTING DATE* late 1980 ———

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	22500	15000	1.125	0.75

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

IS A REPORT ANTICIPATED? Yes - MOE Green Cover

PARTICIPATION BY OTHER MINISTRIES: ---

REMARKS:

Ministry of the Environment
Ontario

PC-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* July 30, 1979

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. Roberts

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT —X— *SOLICITED CONTRACT* ——
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.

DURATION OF PROJECT: 3 *YEARS* *PRESENT YEAR IS* 4th *YEAR* *REPORTING DATE:* Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	63000	3500	4	0.2

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

IS A REPORT ANTICIPATED? Yes - COA report

PARTICIPATION BY OTHER MINISTRIES: ---

REMARKS: Into 4th year because of loss of technician and at the project report write-up stage.

Ministry of the Environment
Ontario

PC-11

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: July 30, 1979

PROJECT TITLE:
Manganese Sequestration

KEY WORDS: Manganese, Potable water

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

LIAISON OFFICER OR SUPERVISOR: K. 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 techniques involving sodium silicate or hydrogen peroxide addition to the raw water will be studied and further optimised.

DURATION OF PROJECT ——— *YEARS* *PRESENT YEAR IS* ——— *YEAR* *REPORTING DATE* as each study completed.

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		4000		0.2

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

IS A REPORT ANTICIPATED? Yes; in house documents re each investigation.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:
This is an on-going study as each new manganese control situation could present a unique treatment requirement.

Ministry of the Environment
Ontario

PC-12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* July 30, 1979

PROJECT TITLE: Asbestos in Potable Water Supplies

KEY WORDS: asbestos, potable water

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

LIAISON OFFICER OR SUPERVISOR: K. J. Roberts

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

OBJECTIVE:

To survey asbestos levels in raw water and treated potable 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. This is essentially an on-going project which monitors asbestos levels.

DURATION OF PROJECT ——— *YEARS* *PRESENT YEAR IS* 6th *YEAR* *REPORTING DATE* April 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	60000	10000	2.5	0.4

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

IS A REPORT ANTICIPATED? Yes - MOE Green bound

PARTICIPATION BY OTHER MINISTRIES: ---

REMARKS:

Ministry of the Environment
Ontario

PC-13

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* July 30, 1979

PROJECT TITLE:
Ozonation of Potable Water Supplies

KEY WORDS: Ozone, potable water

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. Special attention will be paid to coloured waters with low turbidity with emphasis placed on the use of ozone as an alternative disinfectant to avoid chlorinated by-products. This is an on-going area of study - a report on an investigation at the Hawkesbury WTP is being prepared.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		18000		1

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

IS A REPORT ANTICIPATED? Yes; in house documents available to municipalities.

PARTICIPATION BY OTHER MINISTRIES: ---

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control, Applied Sciences Section DATE: May 31, 1979

PROJECT TITLE: WATERMAIN FROST PROTECTION

KEY WORDS: Frost depth prediction, pipe load due to frost, P.V.C. pipe strain relaxtion, strain gages

PRINCIPLE INVESTIGATOR AND AFFILIATION: A. Cohen

LIAISON OFFICER OR SUPERVISOR: M. B. Fielding

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

OBJECTIVE:
In a climate where temperature may drop below -35°C frost protection insulation design is tested and formulae for predicting frost depth are to be developed to aid in protecting buried pipelines from frost.

DESCRIPTION:
In the town of Keewatin about 50°N Latitude, the Ministry has installed 15km of watermain. A 3-m deep bedrock trench was chosen as a test site to monitor soil temperatures and pipe stresses. In this trench a P.V.C. watermain 42m long was imbedded about 2m deep in sand. The trench includes 4 sections each having a different pipe insulation design against frost penetration.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	110,000	30,000	100,000	30,000

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: none

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control, Applied Sciences Section *DATE:* May 31, 1979

PROJECT TITLE:
PRIVATE WASTE DISPOSAL BY SAND FILTER

KEY WORDS: Waste treatment, septic tank, filter

PRINCIPLE INVESTIGATOR AND AFFILIATION: N. A. Chowdhry

LIAISON OFFICER OR SUPERVISOR: M. B. Fielding

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

OBJECTIVE: To observe the performance of field installation of a septic tank - sand filter system for private Waste Disposal.

DESCRIPTION:
The system consists of a two compartment Regulation septic tank and a mild steel walled circular sand filter resting on the native soil for absorption of the treated effluent. A drain from the bottom level of the filter leading to a trench has been provided to dispose of any excess effluent from the system.

DURATION OF PROJECT 4 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* ——

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	60,500	15,000	53,000	13,000

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, Applied Sciences Section *DATE:* May 31, 1979

PROJECT TITLE:

TREATMENT OF DOMESTIC WASTE AND NUTRIENT REMOVAL

KEY WORDS: Private waste, nutrient removal

PRINCIPLE INVESTIGATOR AND AFFILIATION N. A. Chowdhry

LIAISON OFFICER OR SUPERVISOR M. B. Fielding

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

OBJECTIVE:

To investigate alternative methods for Private Waste Disposal in areas where a conventional Septic Tank System cannot be installed.

DESCRIPTION:

A filter system containing medium sand is used for biological treatment of septic tank effluent. In order to provide for situations where nutrients removal is necessary, the sand is mixed with "red mud", a waste by product of bauxite purification containing oxides of Ca, Al and Fe, and with a naturally occuring mineral clinoptilolite in two separate layers in a filter bed for P and N compounds respectively.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	120,000	32,800	105,000	32,000

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-17

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control, Applied Sciences Section DATE: May 31, 1979

PROJECT TITLE:

SOIL CLOGGING BY ANAEROBIC & AEROBIC WASTES

KEY WORDS: Private waste, soil

PRINCIPLE INVESTIGATOR AND AFFILIATION: N. A. Chowdhry

LIAISON OFFICER OR SUPERVISOR: M. B. Fielding

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

OBJECTIVE: To determine any relationship of clogging of soils by anaerobic and aerobic waste effluents with a view to selecting loading rates for subsurface disposal.

DESCRIPTION: In two columns identically packed with the same type of soil, one receives anaerobic effluents from a septic tank and the other aerobic effluent from an underdrained sand filter system. They are being loaded at the same rate. The quality of the final effluents from the two columns is being monitored besides observing any change in the rate of discharge or ponding on the surface due to clogging of soil in any of the columns.

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS: 2nd YEAR — REPORTING DATE: ——

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	35,000	10,000	30,000	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:

REMARKS:

Ministry of the Environment
Ontario

PC-18

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control, Applied Sciences Section *DATE:*

PROJECT TITLE:
SEWAGE EFFLUENT DISPOSAL USING LARGE TILE FIELD

KEY WORDS: Large tile field, subsurface disposal

PRINCIPLE INVESTIGATOR AND AFFILIATION M. M. Ali

LIAISON OFFICER OR SUPERVISOR M. B. Fielding

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

OBJECTIVE:
To investigate the environmental impact of a large scale tile field which is fed with aerobic effluent (45,000 litres/day with 3,000 metres of tile, spread over 2.5 hectares) in an area where soil is of medium percolation.

DESCRIPTION:
After soil analysis determined the suitability of the site, a large tile field was constructed adjacent to the Norwood Sewage Treatment Plant. A batch method of feeding the field was used (40,000 litre/batch), discharging by syphon. Samples and water table readings were taken within and around the bed for three years.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	160,000	20,000	150,000	20,000

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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control, Applied Sciences Section DATE: May 31, 1979

PROJECT TITLE:
HYDRAULIC FLUME ASSIMILATION OF WASTE EFFLUENTS

KEY WORDS: Effluents, TOC, DO, chlorophyll, foam, photosynthesis

PRINCIPLE INVESTIGATOR AND AFFILIATION: Gerald D. Zarnett

LIAISON OFFICER OR SUPERVISOR: M. Fielding

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

OBJECTIVE: To study the effects of surface discharge of effluents in ditches and small water courses using a hydraulic flume.

DESCRIPTION: Sewage effluents and septic tank filter bed effluents of varying concentration were applied to a hydraulic flume 27.5m long and 1m wide. The parameters monitored were TOC, BOD_5, pH, DO, alkalinity, chlorophyll, odour, and formation of foam. Effects of photosynthesis were also considered.

DURATION OF PROJECT: 4 YEARS — PRESENT YEAR IS: 4th YEAR — REPORTING DATE: Nov. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	45,000	11,000	40,000	11,000

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

PC-20

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control, Applied Sciences Section *DATE:* May 31, 1979

PROJECT TITLE: FEASIBILITY OF AUTOMATIC CONTROL FOR WASTEWATER TREATMENT SYSTEMS

KEY WORDS: automatic control, optimal control, activated sludge

PRINCIPLE INVESTIGATOR AND AFFILIATION Gerald D. Zarnett

LIAISON OFFICER OR SUPERVISOR M. Fielding

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

OBJECTIVE:
Analysis of the feasibility of applying automatic control systems to wastewater treatment plants to regulate effluent quality and operating costs.

DESCRIPTION: Automatically controlled and computer controlled plants already on stream are to be evaluated as to the benefits and costs involved. The application of optimal control design to activated sludge systems is considered in detail.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	30,000	10,000	30,000	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

PC-21

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control, Applied Sciences Section *DATE:* May 31, 1979

PROJECT TITLE:

REMOVAL OF ORGANIC COMPOUNDS BY WASTEWATER TREATMENT SYSTEMS

KEY WORDS: organic components, treatment processes

PRINCIPLE INVESTIGATOR AND AFFILIATION Gerald D. Zarnett

LIAISON OFFICER OR SUPERVISOR M. Fielding

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

OBJECTIVE: To observe the patterns or trends in composition and concentration of key organic compounds resulting from the specific operating characteristics of the individual stages of the treatment operation.

DESCRIPTION: The changes in sewage organic components will be examined as they pass through the treatment process noting the occurrence of disappearance of species or the degree of reduction. Correlation of these data with the plant's operating performance and other wastewater parameters is expected to give some indication of the plant's operating characteristics.

DURATION OF PROJECT 5 *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	55,000	11,000	40,000	11,000

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

PC-22

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control, Applied Sciences Section *DATE:* June 1, 1979

PROJECT TITLE: MANHOLE FROST PROTECTION

KEY WORDS: Precast concrete manholes, frost lugs, frost straps, frost heave, strain gages.

PRINCIPLE INVESTIGATOR AND AFFILIATION: A. Cohen

LIAISON OFFICER OR SUPERVISOR: M. B. Fielding

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

OBJECTIVE: In an area where the freezing index is greater than 500°C days a design to minimize cracking of precast concrete manholes due to frost heave was tested.

DESCRIPTION: In the town of Thessalon at approximately 46°N Latitude, the Ministry installed 11km of gravity sanitary sewer lines at depths of between 2.5 and 5.0m including 150 precast concrete manholes. The strain in and temperature just outside of 4 manhole walls were monitored through strain gages and thermocouples respectively. A system by which the upper section was attached to the lower section by steel straps bolted at 2 points at a calculated distance from the section joints, prevented cracking.

DURATION OF PROJECT: 2 YEARS *PRESENT YEAR IS:* 2nd YEAR *REPORTING DATE:* July 79

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	50,000	15,000	35,000	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:

REMARKS:

Ministry of the Environment
Ontario

PC-23

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control, Applied Sciences Section *DATE:* May 31, 1979

PROJECT TITLE: UNDERGROUND MOVEMENT OF CONTAMINANTS FROM A SUBSURFACE WASTE WATER DISPOSAL SYSTEM

KEY WORDS: Subsurface disposal, contaminants

PRINCIPLE INVESTIGATOR AND AFFILIATION M. M. Ali

LIAISON OFFICER OR SUPERVISOR M. B. Fielding

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

OBJECTIVE: To monitor the underground movement of contaminants from subsurface waste water disposal systems.

To determine the effect of the type of waste water pretreatment on the movement of contaminants.

DESCRIPTION: Three 700 litre per day tile field systems were constructed at the Unionville Sewage Treatment plant. The feed to these installations were:

1. Treated secondary effluent - from the treatment plant. (Aerobic effluent).
2. Septic tank effluent (Anaerobic effluent).
3. Lagoon effluent - from the polishing lagoon at Unionville.

The installations were monitored through a regular sampling program using a network of wellpoints for a three year period. Groundwater levels were noted and samples analyzed for contaminants such as Nitrate, Chloride, Sodium, etc.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	180,000	10,000	150,000	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

PC-24

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL

DATE: August, 27, 1979

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 Onatrio 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: 3 YEARS
PRESENT YEAR IS: 3 YEAR
REPORTING DATE: Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$3,000	$500	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-25

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: DATE:

PROJECT TITLE: Conservation of Nitrogen in Aerated Holding Tanks and Aerobic Digester Sludges

KEY WORDS: Aerobic Digestion, Sludge Disposal, Heavy Metals, Nitrogen

PRINCIPLE INVESTIGATOR AND AFFILIATION: J. Smart - MOE

LIAISON OFFICER OR SUPERVISOR: R. Khettry

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

OBJECTIVE:

To assess the fate of nitrogen in aerobic digestion processes with a view to optimizing heavy metal to nitrogen (NH_3+NO_3) ratios for satisfactory land disposal of digested sludges

DESCRIPTION:

Several aerobic digesters and aerated holding tanks are being monitored to show nitrogen conversion pathways. Particular emphasis is being placed on heavy metal to combined NH_3 and NO_3 ratios with respect to safe land disposal of sludges.
The relationship between solids content and nitrogen and metal levels during steady state digestion, settling and supernating operations is being investigated.

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

BUDGET:	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$10,000	$2,500	0.5	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: No

REMARKS:

Ministry of the Environment
Ontario

PC-26

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* August 27, 1979

PROJECT TITLE:

Nitrification and Denitrification of Sewage Treatment Plant Effluents

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

PRINCIPLE INVESTIGATOR AND AFFILIATION A. K. Ho, A. G. Smith

LIAISON OFFICER OR SUPERVISOR R. Khettry

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

OBJECTIVE:

To evaluate unit processes suitable for providing high degrees nitrification and denitrification 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 nitrifying and denitrifying the secondary effluent.

DURATION OF PROJECT 4 YEARS *PRESENT YEAR IS* 4 YEAR *REPORTING DATE* Dec. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$12,000	$4,500	2.25	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
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL DATE: Aug. 27, 1979

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. 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 ____ YEAR — REPORTING DATE: May 1979

BUDGET:	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$3,000	$1000	0.25	0.05

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

PC-28

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* Aug. 27, 1979

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.

DURATION OF PROJECT 8 *YEARS* *PRESENT YEAR IS* 8 *YEAR* *REPORTING DATE* Sept. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$40,000	$2,000		0.1

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

IS A REPORT ANTICIPATED?

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* August 27, 1979

PROJECT TITLE:
UV Disinfection of Secondary Effluent

KEY WORDS: UV Disinfection, Secondary Effluent

PRINCIPLE INVESTIGATOR AND AFFILIATION: K. W. A. Ho, Ontario Ministry of the Environment

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

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

OBJECTIVE:

To investigate the effectiveness of UV radiation for disinfection of typical secondary effluent in Ontario WPCP's (TKN $\leq$ 5 mg/L)

DESCRIPTION:

The project monitoring the performance of pilot-scale, proprietary, UV disinfection equipment at the Richmond Hill, Ontario WPCP. The efficiency of the equipment and the ultility of UV absorbance as a process control parameter will be evaluated on secondary effluent. Nonitoring will extend over three months which include approximately 2½ months of intensive field work.

DURATION OF PROJECT ¼ *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* January, 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$1,500		½	

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* x — *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 supplying the WPCP facility and by Water Refining Inc. who are loaning the UV equipment.

Ministry of the Environment
Ontario

PC 30

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL DATE: August, 1979

PROJECT TITLE:

Efflects 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 Evnironment Canada projects 045 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 W. T. C. 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: 2 YEAR
REPORTING DATE: March 1981

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
$105,100	$34,100		

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, Watewater Technology Centre, Burlington

REMARKS:

Provincial Lotter - 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 69.

Ministry of the Environment
Ontario

PC 31

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* Aug. 1979

PROJECT TITLE:

Disposal of Sewage Sludge on Agricultural Land

KEY WORDS: Sewage Sludge, Sludge, Agricultrual 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 —— *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* 2 *YEAR* *REPORTING DATE* March 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$358,100	$109.900		

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

IS A REPORT ANTICIPATED? Volume VII report is for FY 78/79
Yes. Reports issued yearly in this Project since 1972/73.

PARTICIPATION BY OTHER MINISTRIES:

None

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. 1, 16, 24, 35, 60, 73 and 90 (Volumes 1 - VI)

Ministry of the Environment

Ontario

PL-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WATER RESOURCES *DATE:* August 1979

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* - 3rd *YEAR* *REPORTING DATE* 1981

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$222,100	$94.8	None from MOE	

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: August 1979

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 ——	*UNSOLICITED CONTRACT* ——	*MULTI-YEAR PROJECT* X	
GRANT ——	*SOLICITED CONTRACT* 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 3 *YEARS* — *PRESENT YEAR IS* 3rd *YEAR* — *REPORTING DATE* September 1979

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$92,700	$11.0	None from MOE	

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

REMARKS: Provincial Lottery - Project 77-004-11

Ministry of the Environment

Ontario

PL-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: NORTHEASTERN REGION *DATE:* August 1979

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 ——	*UNSOLICITED CONTRACT* ——	*MULTI-YEAR PROJECT* X
GRANT ——	*SOLICITED CONTRACT* 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* – 3rd *YEAR* *REPORTING DATE* 1981

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
* $309,000	$130,000	None from MOE	

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:

None

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.
CPR contributed $100,000 in Year 3.

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* August 1979

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* 2nd *YEAR* *REPORTING DATE* 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$370,000	$141,800	None from MOE	

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 78-010-33

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* August 1979

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 —— *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* X
MULTI-YEAR PROJECT 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* 2nd *YEAR* *REPORTING DATE* — 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$195,600	$102,100	None in MOE	

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 78-011-12

Ministry of the Environment

Ontario

PL-6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* August 1979

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* 2nd *YEAR* *REPORTING DATE* 1982

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$358,100	$109,900	None from MOE	

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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* August 1979

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* 2nd *YEAR* *REPORTING DATE* —— 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$105,100	$34,100	None from MOE	

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: 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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* August 1979

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* 2nd *YEAR* *REPORTING DATE* —— 1981 ——

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$298,700	$116,300	None from MOE	

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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* August 1979

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* 2nd *YEAR* *REPORTING DATE* 1979

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$65,000	$13,600	None from MOE	

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-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: CENTRAL REGION *DATE:* July 1979

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* 2nd - *YEAR* *REPORTING DATE* 1980

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$36,300	$17,900	None from MOE	

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-11

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources, POLLUTION CONTROL *DATE:* July 1979

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

KEY WORDS: Listowel, Marsh, Experimental Marsh, Heavy Metals, Nutrients, Bacterial Contamination

PRINCIPLE INVESTIGATOR AND AFFILIATION Gore and Storrie Ltd.
M. Palmer. I. Wile, Water Resources Branch

LIAISON OFFICER OR SUPERVISOR S. A. Black

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

OBJECTIVE:
To establish a pilot artificial marsh sewage treatment system to: 1) determine the effectiveness of the system for reducing bacteriological contamination, heavy metals and nutrients on a year round basis; 2) to assess the cost of establishing and operating a marsh-type sewage treatment system in relation to presently accepted modes of treatment; 3) to determine the optimum design for an artificial marsh system, including possible need for plant harvesting measures.

DESCRIPTION: The project will consist of the design, construction and monitoring of the pilot artificial marsh sewage treatment system. The system will occupy a total area of 2.5 acres and will provide for flexibility of operation in terms of retention times and quality and quantity of sewage influent. Both lagoon effluent and effluent from an aerated cell will be used. Some of the emergent vegetation cells will be channeled to permit plant harvesting. The system will be located on property owned by the Ministry of the Environment immediately adjacent to the Listowel sewage treatment facilities.

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, optimum operational modes and types of systems which may be effective in Ontario's climate is lacking.

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

BUDGET: Total to be paid with Lottery Funds = $335,340

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$489,340	$323,340	See below for Partners	

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:

None. This Project is shared with Water Resources Branch and Southwestern Region

REMARKS: The Listowel site offers an excellent opportunity to evaluate, through a pilot system, the various combinations of systems and the practicality of providing artificial marshes to reduce pollutants in the sewage discharges to surface waters.

Provincial Lottery Project 78-018-13

Ministry of the Environment

Ontario

PL-12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: NORTHEASTERN REGION *DATE:* August 1979

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 ——	*UNSOLICITED CONTRACT* X	*MULTI-YEAR PROJECT* X
GRANT ——	*SOLICITED CONTRACT* ——	*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* 2nd *YEAR* *REPORTING DATE* 1979

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$20,000	$5,000	None from MOE	

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 78-019-32

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* October 1979

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* 2nd *YEAR* *REPORTING DATE* 1982

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$380,900	$73,300	None from MOE	

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:

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-14

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* September 1979

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 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$37,000	$23,100	None from MOE	

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 78-021-31

Ministry of the Environment
Ontario

PL-15

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT *DATE:* July 1979

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, Explosion Hazard

PRINCIPLE INVESTIGATOR AND AFFILIATION: Hydrology Consultants Ltd.
1125 Dundas Street East, Mississauga, Ontario

LIAISON OFFICER OR SUPERVISOR: J. Petoia

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

OBJECTIVE: To provide the Ministry of the Environment with information on patterns of gas production and migration at completed and active sanitary landfills and dumps as this relates to site after use and impacts on the use of adjacent lands.

DESCRIPTION: The Project will entail review and assessment of the state of the art of gas production and migration at selected closed sanitary and industrial waste landfill sites. Special testing will be required. Test areas selected will be based on composition, type and volume of waste and type and method of placement. Production and migration patterns of gases, resulting from man-made and natural processes and restrictions will also be investigated.

ANTICIPATED RESULTS:

- Development of a comprehensive state-of-the-art document on landfill gas production and migration and its control.
- Documentation of landfill gas production, migration problems and possible solution to problems in Ontario.
- Development of a data base describing gas production and migration of selected landfill sites in Ontario.
- Quantification of problems real or alleged that relate to landfill gas production and migration.
- Development of criteria that may be adopted as guidelines for use by the Ministry of the Environment regulating completed sanitary landfills.

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

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$285,700	$145,600		

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: None

REMARKS: The information will be beneficial for the determination and selection of future uses of waste disposal areas. It will provide for efficient use of hitherto, unuseable land, which, due to urban development; now occupies prime areas. Results of the study are expected to aid thorough assessment of the necessary requirements for safely incorporating structures on or adjacent to completed solid waste disposal sites.
Provincial Lottery Project 78-023-13

Ministry of the Environment
Ontario

PL-16

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WATER RESOURCES *DATE:* July 20, 1979

PROJECT TITLE: Monitoring Fish Populations in Acid Stressed Lakes of the Haliburton Region

KEY WORDS: Acid Rain, Fish Populations, Acidification, Haliburton, Benthos

PRINCIPLE INVESTIGATOR AND AFFILIATION: University of Toronto, H. H. Harvey, A. P. Zimmerman

LIAISON OFFICER OR SUPERVISOR: R. Reid, Dorset, Ontario. Telephone (705)766-2494

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

OBJECTIVE:

1) to determine which fish species are present and in what relative abundances in approximately twenty lakes in Haliburton-Muskoka studied by the Limnology Unit, Water Resources Branch;
2) to determine the absolute population size, the age and growth rate in 7-8 of the study lakes susceptible to acidification;
3) to determine the effects of acidification on the maturation and spawning processes in these fish populations;
4) to determine the effects of acidification on the benthos of the study lakes.

DESCRIPTION:

The fish populations (presence/absence, relative abundance) will be studied in 20 lakes currently under investigation by the Limnology Unit. Of these, 7-8 (3 in year 1, 4-5 in year 2) will have absolute abundance, age and growth measured for their populations. The effects of acid stress on ionic regulation will be evaluated, as will reproductive success. These are the two likely mechanisms of fish population depletions.

ANTICIPATED RESULTS:

1) An evaluation of the present status of the fish populations in the study lakes; with respect to what the effects have already been on these populations and which populations might be impinged on in the near future.
2) Determination of the mechanism through which acidification effects fish populations.
3) An evaluation of the present status of the benthos in the study lakes.
4) An assessment of how seriously the acidification phenomenon is affecting fish populations in central Ontario will be obtained.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* 1981

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$183,787	$107,027	None from MOE	

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: None

REMARKS: These results will form the basis for decisions re 1) the need for reclamation/rehabilitation of lakes in Central Ontario, 2) the best means of such treatment if required.

The best methods for rehabilitation/prevention of the acidification effects on the fisheries will be determined.

Provincial Lottery Project 79-024-32

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* July 1979

PROJECT TITLE: Feasibility Study on the Chemical Destruction of Hazardous Polyhalogenated Organic Compounds

KEY WORDS: Polychlorinated Organics, Chemical Destruction, Dechlorination, Sodium, Naphthalenide, PCB's, Organics

PRINCIPLE INVESTIGATOR AND AFFILIATION: University of Waterloo
James G. Smith, Department of Chemistry

LIAISON OFFICER OR SUPERVISOR: F. R. Phoenix

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

OBJECTIVE:

a) to examine the dechlorination of hazardous polychlorinated organic compounds using sodium naphthalenide;
b) to select reaction conditions which optimize the conversion of organic chlorine to organic chlorine to sodium chloride;
c) to select reaction conditions which minimize the operating costs of the process;
d) to examine the possibility of "scaling-up" the reaction.

DESCRIPTION: Various polychlorinated organic compounds will be exposed to the action of sodium naphthalenide. Reaction time, reaction temperature, concentration and solvent will be varied. The conversion of organic chloride to sodium chloride will be monitored and residual organic chlorine will be determined. The nature of the organic products will be examined and the recovery of solvent and/or naphthalene will be studied in order to minimize chemical costs.

OUTLINE OF BENEFITS:

A safe method will be available for the destruction of toxic chlorinated organic compounds such as DDT, PCB's, etc. The chemical destruction will be effected in a sealed system so that, no leakage of the product into the environment can occur before the completion of the destruction is checked. Preliminary experiments demonstrate that DDT and PCB's are dechlorinated with an efficiency over 90%. We feel certain the essentially complete dechlorination can be obtained. The question remains whether or not this efficiency can be maintained as operating parameters are changed to reduce operating costs. This can only be answered by experimentation. Scale-up experiments will follow once this question is answered.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$18,100	$18,100	None from MOE	

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: Experience '78 project $2,760
Canadian Electrical Association (PCB's only) $17,500

REMARKS: ANTICIPATED RESULTS: Sodium naphthalenide is known to be highly effective in converting organically bound chlorine to inorganic sodium chloride. It is anticipated that this will occur quantitatively. The original polychlorinated organic will be converted to a hydrocarbon. The final product will be an innocuous mixture of sodium chloride, hydrocarbon, reaction solvent and naphthalene.

Provincial Lottery Project 79-025-31

Ministry of the Environment
Ontario

PL-18

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT *DATE:* July 1979

PROJECT TITLE: Increased Disease Susceptibility after Polychlorinated Bi-Phenyl Exposure

KEY WORDS: PCB's, Disease Susceptibility, Polychlorinated Organics

PRINCIPLE INVESTIGATOR AND AFFILIATION: McMaster University
J. Gauldie, G. Sweeney and D. Clark

LIAISON OFFICER OR SUPERVISOR: P. D. Foley

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

OBJECTIVE: In looking at the complex problem of PCB toxicity it is necessary to examine some widely divergent areas, and this requires expertise in more than one single area. Established techniques used and this project would represent an extensive collaborative effort between chemistry, immunology and pharmacology.

DESCRIPTION: Polychlorinated biphenyls (PCB's) and polybrominated biphenyls (PBB's) constitute a serious problem in modern technological communities. PCB's are endemic in Southern Ontario; certain Great Lakes are significantly contaminated, electrical equipment poses a constant threat and it is estimated that 80% of Michigan's 9 million population harbour measureable levels of PBB's.

The mechanism of toxicity and the effects of the polyhalogenated biphenyls (PCB's, PBB's) has been linked to specific molecular configurations, particularly to the structure-activity of chlorinated dibenzo (p) dioxins. It appears that certain rules apply to the effects of specific PCB and PBB isomers on three major manifestations of toxicity: (1) drug metabolism, (2) organ toxicity and (3) altered immune function. An in depth analysis will be carried out of the increased susceptibility to disease conferred by an altered immune state as a result of exposure to commercial mixtures of polychlorinated biphenyls.

DURATION OF PROJECT: 2 *YEARS* *PRESENT YEAR IS:* 1st *YEAR* *REPORTING DATE:* 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$107,423	$50,800	None from MOE	

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

IS A REPORT ANTICIPATED?

PARTICIPATION BY OTHER MINISTRIES: Ministry of Labour pays $56,623 for year No. 2 of the Project.

REMARKS: It is planned to isolate lymphocytes from the various lymphoid organs (thymus, spleen, lymph nodes, etc.) and measure T cells, B cells, killer cells, suppressor and helper cells and their precursors in these tissues from PCB treated and untreated mice using specific purified defined isomers of PCB. Use of expertise available in three areas will be used: the chemistry of PCB's (Dr. Stephen Safe, University of Guelph), the pharmacology/toxicity of PCB-like molecules (G.S.) and the evaluation of specific immune status.

Provincial Lottery Project 79-026-32

Ministry of the Environment
Ontario

PL-19

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* July 1979

PROJECT TITLE: Ozone Application as an Alternative to Chlorine for Drinking Water Disinfection

KEY WORDS: Ozone, Drinking Water, Disinfection, Chlorine

PRINCIPLE INVESTIGATOR AND AFFILIATION: International Environmental Consultants Ltd.
D. G. Langley, K. L. Murphy

LIAISON OFFICER OR SUPERVISOR: A. Oda

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

OBJECTIVE: The study will identify and quantify by-products which may be formed in drinking water during ozonation and during ozonation - chlorination.

The study will determine the toxicity and potential health hazard of by-products formed during ozonation and during ozonation - chlorination. The by-products will be compared with those formed when drinking water is subjected to conventional chlorination.

DESCRIPTION: A detailed literature search will be on-going for the duration of the study. Experimental laboratory research will be undertaken on raw water from three representative municipalities to measure organic by-products from ozonation, chlorination, ozone/chlorination and ozone/chloramination and to establish the effects of water chemistry and process variables on these by-products. The potential public health effects of the disinfection by-products will be measured by Ames Salmonella/microsome testing for mutagenisis. A pilot scale ozone facility will be installed at Brantford to treat Grand River water for three periods in spring, late summer, and late fall of 1980. Experimental parameters will include ozone dosage, delay time between ozonation and chlorination, and storage time after chlorination,

Special emphasis will be placed on the comparative effectiveness of the combined ozonation-chlorination process in terms of disinfecting water supplies and long-term health implications of any by-products which may be produced.

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*
	$214,680	$108,815	None from MOE	

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

REMARKS: A detailed report will be submitted upon completion of the research which will include cost estimates for add-on ozonation. Operating guidelines for ozone application as an alternative to chlorine disinfection of drinking water will be presented. Information on reduction of potential mutagenic and carcinogenic compounds in drinking water in Ontario should result from this Project.

Provincial Lottery Project 79-027-13

Ministry of the Environment
Ontario

PL-20

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* July 1979

PROJECT TITLE: Effect of Hydraulic Characteristics and Effluent Chlorination on the Incidence of Microorganisms of Public Health Significance in Receiving Waters

KEY WORDS: Hydraulic, Characteristics, Effluent Chlorination, Chlorination Microorganisms, Public Health, Receiving Waters

PRINCIPLE INVESTIGATOR AND AFFILIATION Beak Consultants Ltd.
S.L. Hodd

LIAISON OFFICER OR SUPERVISOR A. Vajdic

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

OBJECTIVE:
- to determine the incidence of pathogenic bacteria and indicator bacteria in sewage treatment plant effluents and their receiving waters;
- to determine if chlorination results in a significantly lower concentration of pathogenic bacteria than for the case of unchlorinated effluents;
- to investigate those hydrological, water quality and atmospheric conditions that contribute to the natural die-off of pathogenic bacteria in non-chlorinated effluents and their receiving waters;
- to determine the need and desirability to use selected pathogenic bacteria in place of indicator organisms as indicators of conditions hazardous to public health in effluents and receiving waters in Ontario.

DESCRIPTION: This project is to be carried out over a three year period and will investigate two sewage treatment plants and their receiving waters each study year. The first phase will include two rivers, the second a river and a lake. Microbiological tests for indicator and pathogenic bacteria will be performed in a mobile field laboratory on the site. The corresponding hydrological surveys will investigate and measure all significant factors which influence bacterial growth and mortality.

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*
	$260,684	$141,896	None from MOE	

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

REMARKS: The results of this investigation should logically lead to the development of guidelines and criteria for effluent disinfection in Ontario.

Provincial Lottery Project 79-028-13

Ministry of the Environment
Ontario

PL-21

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WATER RESOURCES *DATE:* August 1979

PROJECT TITLE: Biomonitoring of Public Water Supplies

KEY WORDS: Biomonitoring. Organics, Fish, Toxicity, Public Water Supplies, Drinking Water, Organics

PRINCIPLE INVESTIGATOR AND AFFILIATION: International Environmental Consultants Ltd.
T. W. Beak, D. G. Langley

LIAISON OFFICER OR SUPERVISOR: G. R. Craig

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

OBJECTIVE: Biologically active organic compounds in drinking water will be identified and quantified at two selected Grand River sites, Seasonal variation of organics will be monitored and spills or slugs will be samples using a biological alarm system and analyzed chemically to identify and quantify constituents. The frequency of spill situations will also be established.

DESCRIPTION: Fish will be exposed to raw drinking water at one site downstream of urban and agricultural inputs. Another site upstream will act as a control monitoring raw water only. Biomonitoring will consist of long-term fish exposure and body burden measurement of organic contaminants. Acute behavioural monitoring using an electronic physiograph with integrating microprocessor will indicate spill or slow discharges of contaminants at the downstream site only. Organic compounds that are chronically and acutely biologically active will be identified and distinguished from those that, although present in drinking water, do not pass through biological membranes and are therefore less of a public health threat.

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

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$214,427	$106,161	None from MOE	

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: Special emphasis may be placed on the control of the discharge of hazardous organics directly into drinking water supplies, an active search for effluents containing these organics can be initiated and a more rigorous treatment of effluents containing these organics can be promoted.

Provincial Lottery Project 79-029-12

Ministry of the Environment
Ontario

PL-22

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL, WATER RESOURCES *DATE:* July 1979

PROJECT TITLE: Kennedy-Burnett Urban Stormwater Runoff Treatment Study. (Part of the Rideau River Study).

KEY WORDS: Urban Drainage, Stormwater Runoff, Kennedy-Burnett, Pond, Rideau River Study, Flooding, Impoundment

PRINCIPLE INVESTIGATOR AND AFFILIATION: Regional Municipality of Ottawa, Carleton

LIAISON OFFICER OR SUPERVISOR: F. A. Tonelli and D. G. Weatherbe

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

OBJECTIVE: To determine the efficiency and effectiveness of short-term impoundment as a means of treatment for stormwater runoff from an urban catchment. To characterise runoff quantity and quality from the urban catchment in relation to precipitation, antecedent dry periods and changes in land use activities. To provide overall study co-ordination of the Rideau River Stormwater Management Study.

DESCRIPTION: A full-scale field study over a three year period, at an impoundment already constructed will permit preparation of a comprehensive report relating to project objectives. RMOC has prepared a detailed proposal on the basis of Project Steering Committee discussions. The first year of work will result in a functioning Treatment - Monitoring system. Data collection will be carried out in May - October of the second and third year. An interim report will be prepared during the second year and a final report at the end of the third year. The Regional Municipality of Ottawa-Carleton is the operator of recently completed and proposed impoundments in lower-tier municipalities within the region. It's operating staff will benefit directly from experience gained in a well controlled field study.

DURATION OF PROJECT: 3 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$330,000	$100.000		

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

IS A REPORT ANTICIPATED? Yes. MOE pays a total of $100,000 to the Project in only the first year

PARTICIPATION BY OTHER MINISTRIES: No. Partners are Ottawa-Carleton, Environment Canada, etc.

REMARKS: Impoundment has been widely proposed as a method of stormwater treatment but reliable data relating to efficiency and effectiveness is not available. Such data is required as input to the Rideau River Study and is desirable before the MOE advocates impoundment treatment for wide scale use.

Provincial Lottery Project 79-030-33

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES *DATE:* July 1979

PROJECT TITLE: Characterization and Identification of Organic Substances in Drinking Water

KEY WORDS: Drinking Water, Organics, Analysis of Organics in Water

PRINCIPLE INVESTIGATOR AND AFFILIATION Ontario Research Foundation
G. H. Thomas, B. S. Das

LIAISON OFFICER OR SUPERVISOR D. Smillie

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

OBJECTIVE:

The objectives of this project are the identification and quantification of organic compounds amenable to analysis in the raw and finished water at two selected sites in Southern Ontario. The variability with respect to the presence and concentration of these compounds will be studied on a time basis in order to establish potential seasonal variations.

DESCRIPTION:

The Ministry has accumulated considerable data on selected organics from a number of water treatment plants in Ontario. However, it is considered appropriate to identify and quantify a more complete spectrum of organic compounds at such plants. Such compounds would range from the very volatile polar and non-polar (e.g. acetone and chloroform), medium volatile (e.g. pesticides and phenols), non-volatile (e.g. carbohydrates, aromatic acids) to polymeric material (e.g. humic acids, celluloses).

ANTICIPATED RESULTS:

It is anticipated that suitable concentration techniques for a complete range of organics in water will be developed, Concommitantly, suitable identification and quantification procedures will also be developed.

DURATION OF PROJECT	2 *YEARS*	*PRESENT YEAR IS*	1st *YEAR*	*REPORTING DATE*	1981

BUDGET:	*TOTAL DOLLARS*		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$200,000	$103,500	None from MOE	

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

REMARKS:

Provincial Lottery Project 79-031-12

Ministry of the Environment
Ontario

PL-24

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* July 1979

PROJECT TITLE: A Study to Evaluate Urban Road Dust as a Source of Suspended Particulates

KEY WORDS: Hamilton, Dust, Urban Road Dust, Suspended Particulates, Air Contamination in Cities

PRINCIPLE INVESTIGATOR AND AFFILIATION United Technology and Science, Incorporated
J. Hunt, F. Frantisak, S. Barton, S. Stevens

LIAISON OFFICER OR SUPERVISOR S. Gewurtz

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

OBJECTIVE:

- to develop an abatement strategy for particulate matter in the City of Hamilton by chemical and physical urban dust characterization, source identification, and an evaluation of available control technologies;
- to use the results to define optimum methodologies for the development and evaluation of a particulate matter control strategy for urban areas on a nationwide basis.

DESCRIPTION: An intensive field study will be carried out in Hamilton in order to determine detailed chemical and physical characteristics of urban dust and its temporal variation. The effect of different street cleaning methods will be assessed. Data will be analysed to identify sources of urban dust and optimum technologies for street cleaning. Based on these results a cost effective control strategy will be identified.

The reduction of suspended particulate matter concentrations in urban areas, primarily through the reduction of emissions from traditional industrial sources, has been the object of considerable effort and expense by both government and industry for many years. Continued efforts in this area are expected and the results of this study will be of assistance in providing a sound scientific basis for the definition of the relative importance of various types of sources and the identification and implementation of cost-effective control strategies.

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

BUDGET: MOE Share of Total is $177,000

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$452,000 for all Partners		None from MOE	

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: Partners in this project are Dofasco, Stelco, Environment Canada and City of Hamilton.

REMARKS: Implementation of the control strategy identified in this study will lead to improved air quality in Hamilton by reducing the concentrations of suspended particulate matter. The cost of this improvement will be minimized by the identification of an optimum cost effective control strategy. The study will develop a method for such strategy development which can be applied to other urban areas at a much reduced cost.

Provincial Lottery Project 79-032-32

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* July 1979

PROJECT TITLE: The Identification of "Abnormal" Values of Lead and Cadmium in Autopsy Material of Occupationally Exposed Individuals

KEY WORDS: Autopsy, Lead, Cadmium, Occupationally Exposed, Trace Metals

PRINCIPLE INVESTIGATOR AND AFFILIATION
University of Waterloo
K. S. Brown, W. F. Forbes, W. H. Cherry

LIAISON OFFICER OR SUPERVISOR M. Fitch, Ministry of Labour, Member of R.A.C.

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

OBJECTIVE: The first aim is to provide estimates of tissue cadmium and lead levels that can be considered "normal" at this time for the various age-sex groups. This information is not available at present for Canadian populations. It is considered of importance since these data will serve as a baseline for future biological monitoring of cadmium in kidney and of lead in bone. Secondly, the project aims to assess how far individuals, who are occupationally or environmentally exposed to cadmium or lead, have elevated tissue metal levels relative to the above-mentioned normal levels. Thirdly, the data may lead to an estimate of the maximum lead and cadmium levels in selected human tissues (bone and kidney, respectively) at which there is no evidence of an abnormal cause-of-death pattern.

DESCRIPTION:

The project aims to estimate the levels of cadmium, zinc and lead in two human tissues (kidney and bone), and to provide an indication of which occupational and environmental factors are associated with the cadmium and lead levels in these tissues. The factors to be investigated are the occupation and place of residence, as well as the sex and age of the tissue donor, the lifetime smoking habit, and the cause of death.

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*
	$99,000	$31,000	None from MOE	

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: Project is recommended by Ministry of Labour

REMARKS: No live human samples are involved.
The relevant permissions for the autopsy samples have been obtained.

Provincial Lottery Project 79-033-33

Ministry of the Environment
Ontario

PL-26

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* July 1979

PROJECT TITLE: Surface Photochemistry of Pollutants

KEY WORDS: Surface Photochemistry, Adsorbed Organics, Air Pollutants, Polycyclic Aromatics

PRINCIPLE INVESTIGATOR AND AFFILIATION: University of Western Ontario
Paul de Mayo

LIAISON OFFICER OR SUPERVISOR: R. B. Caton

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

OBJECTIVE: To establish a fundamental understanding of the photochemistry of organic molecules adsorbed on common surfaces: such is presently essentially non-existent.
To apply such understanding to known or potential pollutants and determine their transformation products. To apply such understanding to the possible interaction on surfaces of combinations of atmospheric pollutants. To discern whether photochemical techniques may be used to destroy pollutants.

DESCRIPTION: It is proposed to carry out:
physical investigations using photochemical and other techniques to acquire basic information about the behaviour and mobility of adsorbed medium-to-large organic molecules;
chemical investigations of the photochemical behaviour of adsorbed polycyclic aromatics along, or in the presence of SO_2, NO_2. The surface will be silica gel, alumina, silicates, carbon etc. Other substances include halogenated aromatics, dioxins, and species capable of generating free radicals.

ANTICIPATED RESULTS: Information as to:

whether, though vapour concentrations of a substance may be low, local concentrations may form on surfaces;
whether aromatic hydrocarbons etc., may be rendered innocuous or more toxic by their irradiation;
whether seemingly harmless compounds may be transformed on a massive or particulate surface into toxic species, either alone or by reaction with other substances.

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*
	$152,000	$50,000	None from MOE	

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 79-034-33

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: *DATE:*

PROJECT TITLE: Field Evaluation of Event Precipitation Samplers for Use in the 'Acidic Precipitation in Ontario'Study.

KEY WORDS: Acid Rain, Samplers, Precipitation Samplers

PRINCIPLE INVESTIGATOR AND AFFILIATION United Technology and Science Incorporated
S. Stevens, R. Wright, D. Kane

LIAISON OFFICER OR SUPERVISOR

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

OBJECTIVE: The objectives of this study are to carry out a field evaluation of several event precipitation collectors of potential value to "APOS", for sampling of both rain and snow. The work will be done by a consulting firm.
Period of Work = August 1979 to February 1980.

DESCRIPTION: Tests will be carried out using several types of collector: (i) a modified HASL - type sampler for true wet-only sampling; (ii) a bulk, funnel-and-bottle-type sampler, suitably modified, using disposable plastic liners, to minimize contamination; and (iii) various cylindrical collectors with different height-to-diameter ratios, for snow sampling. Tests will be carried out on collection efficiency as a function of wind speed and other meteorological parameters, height of the sampler above the ground, and collector design. Various precipitation event collectors have been proposed in the past, or are currently used in the field: every collector seems to have its own specific problems. A simple design has been tried in the Sudbury Environmental Study, which can be improved on considerably for "APOS". This problem has been given much thought, and some preliminary field evaluations have been initiated as well as wind-tunnel studies. If a qualified consulting firm could carry out the proposed program, it is expected that the result will be a sampler specifically suited for precipitation sampling in the Ontario environment.
The precipitation collectors recommended as a result of this study will be used in the "APOS" event collector network, starting with FY 80/81.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$53,598	$53,598	None from MOE	

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: The collection of good event samples is of great importance for the "APOS" program, because the event sampler network results will be used, in conjunction with meteorological analysis and mathematical modelling, for directional source identification and an assessment of Ontario and other source contributions to the precipitation acidity problem. Thus a well-designed, and field-tested, event collector should be developed.
Provincial Lottery Project 79-035-11

Ministry of the Environment
Ontario

PL-28

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT *DATE:* July 1979

PROJECT TITLE: Assessment of the Availability and Cost of Providing Off-Site Third Party Liability Coverage Protection Perpetual Care Task Force.

KEY WORDS: Perpetual Care Task Force, Damage from Disposal Facilities, Third Party Liability, Garbage Sites, Disposal Sites

PRINCIPLE INVESTIGATOR AND AFFILIATION: Geoffry T. G. Scott

LIAISON OFFICER OR SUPERVISOR: G. M. Wood

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

OBJECTIVE: To ascertain the availability and potential cost of Environmental Impairment Liability Insurance to cover the operation of waste management systems and waste disposal sites.

DESCRIPTION:

Details covering the location, operation and management of two representative operations will be collected and analysed and submitted, together with an Environmental Risk Analysis, to the Manager and Underwriters of the Environmental Impairment Liability Insurance Program.

Submission by the Manager of the Insurance Program of complete details of the coverage the underwriters are prepared to provide together with Premium Quotations for the two representative operations.

The availability of insurance at economic rates to disposal facility operators will ensure that such operators are in a position to meet claims from persons whose environmental interests are adversely affected.

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

BUDGET:

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

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

REMARKS:

As a result of this study it will be possible to determine the extent to which insurance cover is available to similar operations on a Province-wide basis and the economic impact of making such insurance obligatory.

Provincial Lottery Project 79-036-11

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WMAB-1

BRANCH: WASTE MANAGEMENT ADVISORY BOARD

DATE: September 7, 19

PROJECT TITLE:

WINE AND SPIRITS PACKAGING IN ONTARIO - PHASE 2

KEY WORDS:

Wine and Spirits Packaging

PRINCIPLE INVESTIGATOR AND AFFILIATION: Peat, Marwick & Partners

LIAISON OFFICER OR SUPERVISOR: P. J. Crabtree

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

OBJECTIVE:

To focus on one possible liquor and wine bottle reclamation system: the collection at the retail outlet. The study will develop the best handling method(s) and identify capital expenditures, operating costs and impact on service to the customer and industry.

DESCRIPTION:

The project will identify and cost the various alternatives for handling bottle returns within the retail system in terms of additional capital and labour. The appropriate equipment will be identified and recommended for each category of store as defined by type of outlet and location in the Province. Options for return of cullet to glass plants will be investigated.

DURATION OF PROJECT: ½ YEARS

PRESENT YEAR IS: Final YEAR

REPORTING DATE: August, 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	47,000	47,000	Not known	

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

IS A REPORT ANTICIPATED? Yes - Consultant's Report to the Board

PARTICIPATION BY OTHER MINISTRIES: Consumer & Commercial Relations - L.C.B.O.

REMARKS:

Ministry of the Environment
Ontario

WMAB-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT ADVISORY BOARD DATE: September 7, 19

PROJECT TITLE:

URBAN SOLID WASTE GENERATION IN ONTARIO - REPORT NO. 3 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 third 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.

In this phase, nine municipalities are co-operating with us in the pilot implementation of the accounting system. The consultant's involvement continues until August, 1979, at which time a report on this phase will be submitted.

DURATION OF PROJECT: ½ YEARS PRESENT YEAR IS final YEAR REPORTING DATE: August, 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	50,000	40,000	not known	

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

IS A REPORT ANTICIPATED?

Yes - Consultant's report to the Board.

PARTICIPATION BY OTHER MINISTRIES:

T.E.I.G.A. - Federal Department of the Environment.

REMARKS:

This phase of the project has been jointly funded by the Federal Government to the extent of $10,000.

Ministry of the Environment
Ontario

WMAB-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT ADVISORY BOARD DATE: September 7, 197

PROJECT TITLE:

STRATEGIC WASTE MANAGEMENT PLANNING
DEVELOPMENT OF WASTE MANAGEMENT MODEL

KEY WORDS:

Planning, Waste Management

PRINCIPLE INVESTIGATOR AND AFFILIATION: Woods, Gordon & Company

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 process for identifying and assessing the impacts of existing and/or proposed waste management policies or programs on any element of the total environment (physical or human), in order that the most effective and least harmful option can be identified.

DESCRIPTION:

The project will develop a framework for a waste management process capable of identifying the interactive impacts between a waste fraction, the option for handling and disposing of it, and the environment. The appropriate model will be manually tested, but no computer programming will be done in this assignment.

DURATION OF PROJECT: ½ YEARS
PRESENT YEAR IS: Final YEAR
REPORTING DATE: March, 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	50,000	50,000	Not known	

SOURCE OF FUNDS:

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

IS A REPORT ANTICIPATED?

Yes - Consultant's report to the Board.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

WM 1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management

DATE: August 2, 1979

PROJECT TITLE:

Use of Refuse Derived Fuel in Cement Kilns

KEY WORDS:

energy, refuse derived fuel (RDF), solid waste, resource recovery

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, 19, 1980

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:

Construction completed in late 1978.
RDF firing commenced in mid-1979.

Ministry of the Environment
Ontario

WM 2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management

DATE: August 2, 1979

PROJECT TITLE: "Feasibility of Separation of the Plastic and Paper Component of the Light Fraction from the ERRP"

KEY WORDS: solid waste, refuse derived fuel (RDF), resource recovery

PRINCIPLE INVESTIGATOR AND AFFILIATION: J. Leidner, Ontario Research Foundation

LIAISON OFFICER OR SUPERVISOR: P. J. Provias, Waste Utilization Section, Waste Management Branch

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

OBJECTIVE:

To identify and evaluate existing techniques for separating film plastics from an air classified light fraction (RDF); to assess these techniques with respect to technical, practicable and economic feasibility.

DESCRIPTION:

Identification of separation techniques is to be based on literature and technical source searches. RDF characterization to be made from various samples of RDF generated at ERRP.

DURATION OF PROJECT: 1.0 YEARS — PRESENT YEAR IS first YEAR — REPORTING DATE: Feb. 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$8,200	$8,200	-	-

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:

Ministry of the Environment
Ontario

WM 3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management

DATE: August 2, 1979

PROJECT TITLE: Experimental Plants 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, baling, conveying systems, and energy recovery. Recovered materials will include paper, cardboard, ferrous metal, clean paper fibre, organic fibre, and compost.

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

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
$15 million capital	$2.6 million operating		4.25

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

IS A REPORT ANTICIPATED?

Project reports issued through Waste Management Branch

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

$1.5 million revenue projected

Ministry of the Environment
Ontario

WM-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT BRANCH *DATE:* September 10, 1979

PROJECT TITLE:
BEVERAGE CONTAINER COMPLIANCE SURVEY

KEY WORDS:
BEVERAGE CONTAINER, COMPLIANCE SURVEY

PRINCIPLE INVESTIGATOR AND AFFILIATION: YORK UNIVERSITY

LIAISON OFFICER OR SUPERVISOR: N. G. Monteith

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

OBJECTIVE:

1. To assess the degree of compliance with beverage container regulations
2. Provide retailers with information on the legislation
3. Obtain retailers' opinion on the legislation

DESCRIPTION:

The beverage container survey will be administered by a contractor who will provide weekly written reports to the Ministry. A questionnaire has been developed by the Ministry to be used by the contractor for data collection.

Retail outlets will be selected at random mostly in and around Metropolitan Toronto and other areas agreed to. The contractor hires University students who conduct the actual interviews.

DURATION OF PROJECT: one *YEARS* *PRESENT YEAR IS* 1979 *YEAR* *REPORTING DATE* Oct. 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$31,000	$31,000	by contractor	

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:

Ministry of the Environment
Ontario

WM-5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management

DATE: Sept. 7, 1979

PROJECT TITLE:

SITE IDENTIFICATION STUDY, 1979

KEY WORDS:

OLD WASTE DISPOSAL SITES, WASTE.

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. Jack Ellis, York University, Toronto, Ontario
Dr. J. Robert Morris, Laurention University, Sudbury, Ontario
~~Dr. Robert G. Rosehart, Lakehead University, Thunder Bay, Ontario~~

LIAISON OFFICER OR SUPERVISOR: Leslie A. Ficzere, G.M. Wood

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

OBJECTIVE:

To identify and record the location, size, volume, dates of use, type of waste, etc., available on waste disposal sites, domestic, commercial, industrial, solid and liquid, public and private, prior to 1971 when present certification system and records were established and any additional sites where wastes may have been disposed of without the knowledge of the Ministry.

DESCRIPTION:

The Ministry is often faced with the problem of providing information relating to development on lands where, at some time in the past, there may have existed some waste disposal facility or activity. (Section 46, Part V, EPA). The study is to provide meaningful information, identify potentially hazardous situations.

DURATION OF PROJECT: 1 YEARS

PRESENT YEAR IS: 1979 YEAR

REPORTING DATE: Oct. 31, 1979

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
$100,000 ?	$1000,000 ? min		

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:

Ministry of the Environment

WM-6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT

DATE: September 11, 1979

PROJECT TITLE:

THE CHEMICAL DESTRUCTION OF HAZARDOUS POLYCHLORINATED ORGANIC COMPOUNDS

KEY WORDS:

PRINCIPLE INVESTIGATOR AND AFFILIATION: J. G. Smith, University of Waterloo

LIAISON OFFICER OR SUPERVISOR: F. R. Phoenix

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

OBJECTIVE:

TO DESTROY LOW LEVELS OF PCB

DESCRIPTION:

APPLICATION OF THE SODIUM NAPTHALENE METHOD TO REMOVE LOW LEVEL CONTAMINATION (PCB) IN TRANSFORMER OILS.

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

BUDGET:

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

SOURCE OF FUNDS: Provincial Lottery

REGULAR WORK PROGRAM ---- SPECIAL MINISTRY FUNDING ---- JOINTLY FUNDED PROJECT ---- OTHER ----

FINAL REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

WM-7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT *DATE:* September 11, 1979

PROJECT TITLE:
ASSESSMENT OF THE 'KING' TECHNOLOGY FOR DISPOSAL

KEY WORDS: 'KING', ELECTRO CHEMICAL, LIQUID, INDUSTRIAL, WASTE

PRINCIPLE INVESTIGATOR AND AFFILIATION CHEMICAL AND PETRO WASTE DISPOSAL LIMITED

LIAISON OFFICER OR SUPERVISOR P. S. Isles

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

OBJECTIVE:
To assess the 'King' electro chemical process for treating certain liquid industrial wastes.

DESCRIPTION:

The process uses an electric field to produce an orderly array of water molecules and ions. The resultant dehydrated and combined particles become denser and settle to the bottom of the tank for removal.

DURATION OF PROJECT .50 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Dec, 1979

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$30,000	$30,000		

SOURCE OF FUNDS: Waste Management Branch
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

WM-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT BRANCH *DATE:* September 7, 1979

PROJECT TITLE:

GAS MIGRATION STUDY

KEY WORDS: WASTE, GAS MIGRATION, CH_4 LANDFILL

PRINCIPLE INVESTIGATOR AND AFFILIATION HYDROLOGY CONSULTANTS LIMITED

LIAISON OFFICER OR SUPERVISOR J. Petoia

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

OBJECTIVE:

To research the "State-of-the-Art" information. To evaluate gas production and movement at landfills. To develop the correlation between distance and intensity of gas migration. To develop reliable field data suitable for computer model verifications.

DESCRIPTION:

The purpose of this study is to provide the Ministry of the Environment with information on patterns of gas production and migration at sanitary landfills. The information will be beneficial for the determination and selection of future uses of landfill areas.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$287,500		by contractor	

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NONE

REMARKS:

Ministry of the Environment
Ontario

WR-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology and Monitoring *DATE:* June 26, 1979.

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 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 eighteen months (see also remarks)

BUDGET:
TOTAL DOLLARS [illegible] *CURRENT YEAR* $63,000
MAN YEARS [illegible] *CURRENT YEAR* 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; three reports for Northern Ontario; South Nation (in draft); Holland - Black (in draft); field work has begun in the Humber - Don.

Ministry of the Environment
Ontario

WR-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology and Monitoring *DATE:* June 26, 1979

PROJECT TITLE:
Ground Water Probability Mapping

KEY WORDS: Ground Water; Probability; 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* X — *CONCURRENT PROJECT* ——

OBJECTIVE:
To determine the yield of ground water to wells in counties throughout Ontario.

DESCRIPTION:

The project involves mapping of ground-water resources in various counties in the Province. The maps are intended to provide basic ground-water data and interpretations on the availability of ground water throughout each county in order that water-supply potentials can be assessed for various uses. These maps indicate the probable yields of wells, depths at which water is found and the depths to static water levels. Ground-water chemistry is also indicated.

DURATION OF PROJECT: On-going ——— *YEARS* *PRESENT YEAR IS* ——— *YEAR* *REPORTING DATE:* every 18 months (also see remarks)

BUDGET:

	TOTAL DOLLARS	MAN YEARS
	~~TOTAL PROJECT~~ / CURRENT YEAR	~~TOTAL PROJECT~~ / CURRENT YEAR
	$16,000	1

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

IS A REPORT ANTICIPATED? Yes - part of "Water Resources Map" Series

PARTICIPATION BY OTHER MINISTRIES: NIL

REMARKS:

Published reports to date include the following counties: Lambton, Kent, Essex, Elgin, Brant, Haldimand and Norfolk. Work is completed on Peel and progressing on Simcoe.

Ministry of the Environment
Ontario

WR-3

1979/80 Projects

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology and Monitoring *DATE:* June 26, 1979.

PROJECT TITLE:
Ground - water Resources of the Grand River Basin.

KEY WORDS:
Grand River; Ground water; Aquifers; Municipal Ground-water supply.

PRINCIPLE INVESTIGATOR AND AFFILIATION D. Walmsley, R. Szudy.

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 the Grand River basin.

DESCRIPTION:
Ground water is an important resource being used for domestic and municipal water supplies by most communities in the Grand River basin. The project consists of mapping the major aquifers within the basin and identifying areas suitable 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	$78,000	7	3.5

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

IS A REPORT ANTICIPATED?
Yes. In the Grand River technical report series and the final water-management report.

PARTICIPATION BY OTHER MINISTRIES:
MNR, OMAF

REMARKS:

Ministry of the Environment
Ontario

WR-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology and Monitoring *DATE:* June 26, 1979

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 impacts 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 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	MAN YEARS
	CURRENT YEAR	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 Committee and in liaison with Consumer and Commercial Relations and most hydrogeological consultants.

REMARKS:

Ministry of the Environment
Ontario

WR-5

RESEARCH AND DEVELOPMENT INVENTORY

1979/80 Projects

BRANCH: Water Resources - Hydrology and Monitoring *DATE:* June 26, 1979

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 observation wells and carrying out test drilling for ground-water exploration and contamination studies more costly, the use of geophysical techniques for subsurface investigations is being increased. It is 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 of the Geotechnical Services Unit.

DURATION OF PROJECT Continuing ——— *YEARS* *PRESENT YEAR IS* ——— *YEAR* *REPORTING DATE* Ongoing

BUDGET:

	TOTAL DOLLARS	*MAN YEARS*
	CURRENT YEAR	*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

1979/80 Projects

WR-6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources, Limnology & Toxicity *DATE:* June 29/79

PROJECT TITLE:
Acidification of Lakes

KEY WORDS: Acid precipitation, acid lakes, chemistry & biology of acid lakes

PRINCIPLE INVESTIGATOR AND AFFILIATION: Peter Dillon

LIAISON OFFICER OR SUPERVISOR: Tom Brydges

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

OBJECTIVE:
To develop a strategy to protect the Ontario environment based on the study of acidic precipitation and its effects on the chemistry and biology of the streams and lakes.

DESCRIPTION:
The aspects to be covered in 1979 are as follows:

- continuing current lake, stream and precipitation sampling
- selecting new study lakes more suitable to the study objectives than those currently being studied for other reasons.
- providing data for air mass trajectory analysis in cooperation with the Air Resources Branch
- collecting and analyzing sediment cores
- designing and building equipment for measuring in-situ primary production
- developing computer programs for data assessment and result presentation

DURATION OF PROJECT: 3 YEARS *PRESENT YEAR IS:* 1 YEAR *REPORTING DATE:* see below

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		262K		3

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

IS A REPORT ANTICIPATED? Interim reports have been published and more are in preparation. A package of relevant MOE reports is currently available.

PARTICIPATION BY OTHER MINISTRIES:
M.N.R.

REMARKS:
Several aspects of the work are being done by contract

Ministry of the Environment
Ontario

WR-7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources, Limnology & Toxicity

DATE: June 29, 1979

PROJECT TITLE:
Sudbury Environmental Study

KEY WORDS: Acid Rain, Heavy metals, Nutrient Budgets, Hydrology

PRINCIPLE INVESTIGATOR AND AFFILIATION: Norman Yan

LIAISON OFFICER OR SUPERVISOR: Peter Dillon

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

OBJECTIVE:
To determine the environmental impact of mining operations in the Sudbury area and to develop criteria for lake management of the air emissions from smelting operations in the area. Specific water resources objectives are to define the cause and extent of low pH conditions in lakes, define rates of change and develop remedial measures.

DESCRIPTION:
The following aspects will be examined during 1979:

- monitoring of an acidic lake
- determining the chemical and biological changes occurring the year after fertilization of four lakes.
- monitoring changes in lakes previously neutralized
- sampling 12 selected lakes from the extensive lake survey
- constructing detailed geology maps of the lake basins
- constructing and calibrating models to predict the effects of changes in acid loading to lakes and to predict the duration of ameliorative techniques such as liming.

DURATION OF PROJECT: 7 YEARS — PRESENT YEAR IS: 7 YEAR — REPORTING DATE: see below

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		190K		6

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

IS A REPORT ANTICIPATED? Interim reports have been produced and more are in preparation. A final report will be prepared in 1980.

PARTICIPATION BY OTHER MINISTRIES:
Ministry of Natural Resources

REMARKS:
This is the final field year of a separate Sudbury Environmental Study. In 1980/81 much of the work will be combined with the provincial study on acid precipitation.

Ministry of the Environment

WR-8

RESEARCH AND DEVELOPMENT INVENTORY

1979/80

RESEARCH: Water Resources

DATE: June 29, 1979

PROJECT TITLE: Retention of nutrients and metals in lake sediments

KEY WORDS: Sediments, Sedimentation, Nutrients, Lead, Heavy Metals

PRINCIPLE INVESTIGATOR AND AFFILIATION: P.J. Dillon, Head
Limnology and Toxicity Section

LIAISON OFFICER OR SUPERVISOR: T.G. Brydges, Supervisor
Limnology and Toxicity Section

RESEARCH CATEGORY: INTERNAL x — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — 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 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: 3 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?

PARTICIPATION BY OTHER MINISTRIES:
No

REMARKS:

Ministry of the Environment
Ontario

WR-9

RESEARCH AND DEVELOPMENT INVENTORY

1979/80 Projects

RESEARCH: Water Resources

DATE: June 29, 1979

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.J. 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 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:
measuring the chemical budgets of selected lakes and determining what portion of the chemical inputs can be attributed to development,and
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:
lake hydrology,
lake and stream chemistry,
precipitation chemistry and
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	5 YEAR	REPORTING DATE	March 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	1.2 m	250K	36	6

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

IS A REPORT ANTICIPATED? Interim reports have been published and more are in preparation. Final report is due in March 1981

PARTICIPATION BY OTHER MINISTRIES:

Ministry of Housing & Ministry of Natural Resources

REMARKS:

Ministry of the Environment
Ontario

WR-10

1979/80 Projects

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources, Limnology & Toxicity *DATE:* June 29/79

PROJECT TITLE:
LAKE RESTORATION

KEY WORDS: lakes, water quality, restoration techniques

PRINCIPLE INVESTIGATOR AND AFFILIATION Glen Robinson

LIAISON OFFICER OR SUPERVISOR Peter Dillon

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

OBJECTIVE:
To evaluate a variety of techniques to improve water quality in lakes.

DESCRIPTION:
Four techniques are under study; phosphorus removal, destratification, sediment traps and nutrient inactivation. Phosphorus removal has been applied in three study areas; Gravenhurst Bay, Penetang-Midland Bay and the Bay of Quinte. Biological changes are monitored regularly.

Two lakes have destratification equipment installed; Heart and Thompson. Heart Lake is a multi-use recreational lake while restoration of fishing is the main objective for Thompson Lake.

Two man-made lakes in Mississauga are under study for the effects of sediment traps on the inlet drains. Final surveys are being conducted on a lake treated with alum for nutrient inactivation.

DURATION OF PROJECT on-going *YEARS* *PRESENT YEAR IS* —— *YEAR* *REPORTING DATE* various times

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		32K		1.3

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

IS A REPORT ANTICIPATED? As information justifies

PARTICIPATION BY OTHER MINISTRIES:
Joint projects on the Bay of Quinte with M.N.R., Federal Government and Universities.

REMARKS:

Ministry of the Environment
Ontario

WR-11

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

1979/80 Projects

DATE: June 29, 1979

PROJECT TITLE: Metals in Lakes

KEY WORDS: Heavy metals, phytoplankton, zooplankton, precipitation

PRINCIPLE INVESTIGATOR AND AFFILIATION: S.L. Wong, R. Strus

LIAISON OFFICER OR SUPERVISOR: P.J. Dillon, Head, Limnology Unit

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: 2 YEAR

REPORTING DATE: as information is generated

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	120K	40K	6	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-12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources 1979/80 Projects DATE: June 29, 1979

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 smaller 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: 1 YEAR
REPORTING DATE: As information is generated

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	225	74	6	2

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Other participating groups include London Region-MOE, Wastewater Treatment Section MOE and Hydrology and Monitoring-Water Resources also the Town of Listowel.

Ministry of the Environment
Ontario

WR-13

RESEARCH AND DEVELOPMENT INVENTORY

1979/1980

BRANCH: Water Resources

DATE: June 25, 1979

PROJECT TITLE:
Grand River Basin Water Management Study - Water Management Modelling.

KEY WORDS: Hydrology, Water Quality, Stream Biomass, Urban Drainage, Economic Systems, Water Management Models.

PRINCIPLE INVESTIGATOR AND AFFILIATION L. A. Logan, D. G. Weatherbe, S. N. Singer, Water Modelling Section

LIAISON OFFICER OR SUPERVISOR F. C. Fleischer, Water Modelling Section

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

OBJECTIVE:

Framing and evaluating integrated alternative water management strategies designed to optimize water use for waste assimilation, water supply, flood damage reduction and recreation for the Grand River Basin, for existing and projected future conditions.

DESCRIPTION: Computer models have been developed and are being applied for the Grand River Basin Water Management Study, in the following areas:

A. Hydrology - Generation of long term streamflow response sequences using a comprehensive, parametric hydrologic watershed model (NWSRFS), stochastic data generation and statistical regression models.
B. Water Quality - Steady state Streeter-Phelps type models and an integraded dynamic water quality model are used to define effects of point and non-point source pollutant inputs.
C. Stream Biology/Biomass - A parametric model has been developed to allow simulation and prediction of stream plant and algae biomass growth and die-off and associated effects on stream dissolved oxygen regime; to be linked to dynamic water quality model.
D. Urban Drainage - Stormwater management model, STORM, has been applied to major municipalities to define pollutant loadings due to stormwater runoff.
E. Economic Systems - A linear programming systems model has been developed and is being applied to define economics of water quality, water supply, flood control options and and to screen alternatives.

DURATION OF PROJECT	*PRESENT YEAR IS*	*REPORTING DATE*
3 YEARS	3RD YEAR	March 1980, Sept./80

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$550. K	$175. K	30	7

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; final water management report, September, 1980.

PARTICIPATION BY OTHER MINISTRIES:
Complementary hydrologic modelling by Ministry of Natural Resources and Grand River Conservation Authority.

REMARKS: Work as outlined is being undertaken as part of overall Grand River Basin Water Management Study, involving Ministry of the Environment, Ministry of Natural Resources and Ministry of Agriculture and Food and Grand River Conservation Authority as major participants.

Ministry of the Environment
Ontario

WR-14

RESEARCH AND DEVELOPMENT INVENTORY

1979/1980

BRANCH: Water Resources Branch

DATE: June 25, 1979

PROJECT TITLE:

Mixing and Dispersion of Effluents in Natural Streams

KEY WORDS:
Dispersion, Mixing Zones, Modelling

PRINCIPLE INVESTIGATOR AND AFFILIATION: T. P. H. Gowda, 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 —— 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 distance 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 assist in development of guidelines and criteria for water quality management in the mixing zones.

DESCRIPTION:

Investigations are being carried out on the effluent mixing zones in the Grand River. Mathematical expressions for plume width, crossing distance and mixing zones 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 on-going research into mixing phenomena in rivers.

DURATION OF PROJECT: 4 YEARS — PRESENT YEAR IS: 4 YEAR — REPORTING DATE: 1979

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$60. K	$20. K	3	1

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

IS A REPORT ANTICIPATED? 1978: Prediction of chlorine residuals; 1979: Mixing and dispersion of effluents; Ammonia toxicity in mixing zones.

PARTICIPATION BY OTHER MINISTRIES: Co-operating with Canada Centre for Inland Waters in Model development.

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-15

1979/80 Projects
RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources Branch *DATE:* June 22, 1979

PROJECT TITLE:
Great Lakes Program

KEY WORDS: Water Quality Surveillance, Pollution Control, Great Lakes Quality

PRINCIPLE INVESTIGATOR AND AFFILIATION J. Kinkead, Water Resources Branch, MOE

LIAISON OFFICER OR SUPERVISOR S. E. Salbach

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

OBJECTIVE: To study the Great Lakes for (1) defining need for and nature of pollution control requirements;
(2) evaluating effectiveness of control programs;
(3) establishing water quality trends
(4) defining research needs and emerging new problems.

DESCRIPTION:
As a multi-disciplinary surveillance program jointly funded by the federal and provincial government, through the Canada-Ontario Agreement, it covers the Great Lakes from Lake Superior to the St. Lawrence River. Its primary purposes include satisfying the pollution control requirements of the Ministry of the Environment and the ministry's obligation under the Canada-U.S. Agreement and the Accord between the Province and Canada. The program emphasizes the lakes' nearshore areas.

DURATION OF PROJECT ongoing *YEARS* *PRESENT YEAR IS* 15th *YEAR* *REPORTING DATE* annually

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		1.9 million		71

SOURCE OF FUNDS: 50/50 Province/Federal
REGULAR WORK PROGRAM X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* X — *OTHER* ——

IS A REPORT ANTICIPATED? Yes - Project report addressing problem areas and contributions to Great Lakes Water Quality Board annual reports.

PARTICIPATION BY OTHER MINISTRIES:
OMNR, OMOL

REMARKS:

Ministry of the Environment
Ontario

WR-16

RESEARCH AND DEVELOPMENT INVENTORY

1979/80 PROJECTS

BRANCH: WATER RESOURCES DATE: July 13, 1979

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, D. Poulton, B. Kohli, I. Heathcote
Lake Systems Unit

LIAISON OFFICER OR SUPERVISOR: R. Weiler

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

OBJECTIVE: Continue monitoring of Hamilton Harbour water quality to assess compliance with IJC objectives and monitor trends. Determine the biological, chemical and physical processes on the harbour, especially oxygen depletion and exchange rates between the harbour and Lake Ontario. Develop models that simulate these processes; in particular a 3-dimensional circulation model and oxygen depletion models. Determine what abatement programs are required for compliance, based on the processes and models.

DESCRIPTION: Measurement of water quality, harbour-lake exchange, physical-chemical processes and biological community abundance, distribution and composition; oxygen depletion rates, oxygen budget refinement. Development of models simulating physical, chemical and biological processes in the harbour.

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

BUDGET: amounts in ( ) are included in overall Great Lakes Budget

	TOTAL DOLLARS	MAN YEARS
TOTAL PROJECT		
CURRENT YEAR	($129,000)	(3.8)

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

IS A REPORT ANTICIPATED? Yes, annually

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Physical Veriability and Phytoplankton Communities (Harris, etc.) Research in Hamilton Harbour 1978-79 (Harris,etc.)
Hamilton Harbour Study: May, 1974, 1974, 1975, 1976 (not yet released)
Biological Survey of Hamilton Harboru 1975, 1976 (Harris, etc.)
Mass exchange between Hamilton Harbour and Lake Ontario (B. Kohli, J. Great

Ministry of the Environment
Ontario

WR-17

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: 1979-80 Projects DATE: July 13, 1979

PROJECT TITLE:

Nanticoke Current and Chemistry

KEY WORDS: Water Movement, Water Chemistry, Thermal Discharge

PRINCIPLE INVESTIGATOR AND AFFILIATION: I. Heathcote, B. Kohli, R. Weiler, Water Modelling Section

LIAISON OFFICER OR SUPERVISOR: R. Weiler

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 discharges from the Ontario Hydro generating station, Stelco and Texaco refineries and industrial and urban development in the Nanticoke area.

DESCRIPTION:

Recording current meters are in operating and periodical sampling of water for chemical analysis is continuing.
1979/80 is devoted chiefly to data synthesis for the period 1969-1978.

DURATION OF PROJECT: 15 YEARS — PRESENT YEAR IS: 10 YEAR — REPORTING DATE: Annually

BUDGET: amounts in ( ) are included in overall Great Lakes budget

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		($60,000)		(1.8)

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

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:
Natural Resources, Ontario Hydro, Stelco, Texaco

REMARKS: Reports published: Water Chemistry - 1970, 1969-71, 1972, 1973, 1974, 1975 1976 (M. Palmer, J. Polak)
Water currents 1967-70 (M. Palmer & R. Walker);
1974, 1975, 1976 (B. Kohli)

Ministry of the Environment

WR-18

RESEARCH AND DEVELOPMENT INVENTORY

1979/80 Projects

BRANCH: Water Resources

DATE: July 13, 1979

PROJECT TITLE: TORONTO HARBOUR STUDY

KEY WORDS: Water Quality, Harbour-Lake exchange, modelling, trend analysis

PRINCIPLE INVESTIGATOR AND AFFILIATION: D. Poulton & B. Kohli
Lake Systems Unit

LIAISON OFFICER OR SUPERVISOR: R. Weiler

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 compliance with IJC objectives and resultant water quality from operating abatement programs. Determine what further abatement programs are needed for compliance. Continue work on determining water quality trends particularly for nutrients and phytoplankton. 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, including direct input of City of Toronto stormwater runoff modelled flows and concentrations.

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS: 3 YEAR — REPORTING DATE: Ann ually

BUDGET: amounts in ( ) are included in overall Great Lakes budget

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		($43,000)		(1.2)

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

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:
Natural Resources, Harbour Commission, Metro Toronto, City of Toronto

REMARKS: Reports already released: Water Quality conditions in Toronto Harbour by recording chemistry meters 1975-76 (D.J. Poulton
Toronto Harbour numerical model (D.J. Poulton)
Physical Aspects of Toronto Harbour (B.J. Kohli)
Application of short-time scale recording meter data to numerical modelling of

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Ontario

WR-19

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources 1979/80 Projects DATE: July 13, 1979

PROJECT TITLE: Environmental Pathways of Selected Chemicals in Freshwater Systems

KEY WORDS: Water Quality, removal rates

PRINCIPLE INVESTIGATOR AND AFFILIATION

LIAISON OFFICER OR SUPERVISOR: R.Weiler

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

OBJECTIVE: To determine the relative importance of biological, chemical and physical processes, such as bioligical uptake, hydrolysis, exc hange with atmosphere, adsorption by sediments, etc., which remove selected organic and inorganic chemicals from the water column.

DESCRIPTION:

The contractor is to collect the available information on the processes by which specified chemicals are removed from aquatic systems (chiefly lakes and rivers) and the rates of such procesees. Both field and laboratory data should be evaluated and the most probable rates be specified. The report should also provide a critical evaluation of the information collected.

DURATION OF PROJECT: 1 YEARS PRESENT YEAR IS: 1 YEAR REPORTING DATE: March, 1980

BUDGET: amounts in ( ) are included in overall Great Lakes budget

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		($30,000)		

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

WR-20

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources, Limnology & Toxicity *DATE:* June 29/79

PROJECT TITLE: Young fish surveys

KEY WORDS: PCB's, mercury, pH, contaminant trends

PRINCIPLE INVESTIGATOR AND AFFILIATION Karl Suns ,

LIAISON OFFICER OR SUPERVISOR Gordon Craig

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

OBJECTIVE:
To use young-of-the-year fish as monitors to reflect contaminant uptake under current conditions and over defined geographical areas.

DESCRIPTION:
Young-of-the-year fish obviously reflect current contaminant uptake conditions and since they do not range very far they also give an indication of the geographical distribution of uptake conditions. The technique is being applied in several areas:

- English-Wabigoon river system to study mercury uptake
- Great Lakes to determine trends in time of PCB's and other organic chemicals
- inland lakes to study the effect of acid precipitation on mercury uptake
- inland lakes to determine effects of road oiling as a source of PCB's to fish
- near sewage treatment plant effluents to relate any contaminants found in the effluents to their potential for biological uptake.

DURATION OF PROJECT on-going *YEARS* *PRESENT YEAR IS* —— *YEAR* *REPORTING DATE* each year

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		55K		2

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

IS A REPORT ANTICIPATED? Reports are prepared each year

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

WR-21

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: July 1979

PROJECT TITLE:
Organic compounds in selected sewage treatment plant effluents and organic residues in exposed fish populations

KEY WORDS: final effluents; industrial organics; bioaccumulation in fish; sewage treatment plant

PRINCIPLE INVESTIGATOR AND AFFILIATION: C. Curry - MOE permanent
S. Short - EPS contract

LIAISON OFFICER OR SUPERVISOR: K. Suns

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

OBJECTIVE:
1) undertake literature review of relevant studies
2) identify and quantify organic compounds from selected sewage treatment plant effluents discharged to the Great Lakes from Ontario and establish an inventory of these contaminants
3) identify and quantify organic compound residues in resident fish populations affected by sewage treatment plant discharges

DESCRIPTION:
PHASE I - final effluents from 10 municipal sewage treatment plants will be collected for GC-MS analyses. Composite sampling techniques will be used to minimize major fluctuations in chemical composition of the effluent.

PHASE II - depending on the results obtained from Phase I, sewage treatment plants will be selected for further final effluent collections. Phase I result evaluations will also provide direction for selection of three sites for nearshore fish collections.

PHASE III - the final phase of the study will be devoted to result evaluations and report preparation. Estimates for compound loadings to the receiving waters will be prepared for each sewage treatment plant.

DURATION OF PROJECT: 1 YEARS — PRESENT YEAR IS: 1 YEAR — REPORTING DATE: December 31/79

BUDGET:
$26,780 - EPS
$16,500 - MOE

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$43,280		1 year	

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

IS A REPORT ANTICIPATED? December 31, 1979

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:
This project addresses the Great Lakes contaminant problems in identifying representative sources and loadings of organics and inorganics. The fish analyses will provide information on the impact of these sources on the aquatic biota. This study complements the St. Clair program designed to identify volatile & solvent extractable organics discharged by industry.

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