INVENTORY OF RESEARCH PROJECTS 1980-81

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1981

Ontario Ministry of the Environment

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

Graham W. S. Scott, Q.C.,
Deputy Minister

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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
Pollution Control Branch

F.Y. 1980/1981

INVENTORY OF RESEARCH PROJECTS

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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. The initial Inventory was prepared by the Strategic Planning Branch. The Research Advisory Committee was appointed in 1975 and is now responsible for the preparation of the Inventory.

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 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 1980/81 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 major 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 80/81 by the Provincial Lottery Trust Fund they are shown in sequence on the pages marked "PL". These same projects are also shown in some instances on the sheets from the respective Branch supervising the Lottery Project.

This Inventory lists Ministry of the Environment Research Projects for FY 80/81 undertaken up-to-date October 1, 1980.

FORMAT OF FY 80/81 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	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 Ministry of the Environment 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.
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.
Duration of Projects in Years	Starting and completion dates.
Budget	Current year total dollars and man years for the project. These are estimates 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 for Water Quality in the Great Lakes. 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 Trust Fund which is available for health-oriented environmental projects. Twenty-six (26) projects are being funded in 1980/81 at a budget of $1.80 million. All of these projects are 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, FY 78/79 and FY 79/80 Research Projects with FY 80/81 Research Projects According to Time Duration

	FY 77/78	FY 78/79	FY 79/80	FY 80/81
Projects in their first year	58	60	69	75
Projects in their second year	25	36	59	56
Projects in their third year	23	18	23	25
Projects in their fourth year	9	9	19	12
Projects existing for five years or longer	25	18	13	12
Total Research Projects	140	141	183	180
Projects conducted within the Ministry of the Environment	85	63	102	103
Projects conducted by Outside Contracts at Universities and Consultants	55	78	81	77

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Ministry of the Environment
Ontario

AR-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: 11th July 1980

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

KEY WORDS: Multielement analysis, alkyl lead, organic manganese, gas chromatography - atomic fluorescence spectrometry

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

LIAISON OFFICER OR SUPERVISOR: J. Bishop

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

OBJECTIVE:
Development of sensitive analytical techniques for chemical states of metals on filter samples.

DESCRIPTION:
GC-AFS methods previously developed for lead compounds in air will be extended to organic manganese compounds used as anti-knock additives to gasoline. Research will also be done on simultaneous multielement determination of material collected on air filters.

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
	54,250 (3 yr.)	21,050	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-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: 11th July 1980

PROJECT TITLE: Trace Analysis and Methods Development for Compounds Associated with Incinerator Effluents, Combustion Sources 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: R. Caton and G. Rees

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 fly ash samples to provide a data base on suspected precursors for polychlorinated dibenzo-p-dioxins.

DESCRIPTION:

Fly ash and other samples will be analyzed for dioxins and other toxic compounds. The results will be related to incinerator operating variables.

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
	86,336 (3 yrs)	30,836	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-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: 11th July 1980

PROJECT TITLE: The Determination of Nitro-Substituted Polycyclic Aromatic Hydrocarbons in Automobile Exhaust and Urban Air.

KEY WORDS: Trace analysis, method development, nitro-PAH

PRINCIPLE INVESTIGATOR AND AFFILIATION: Professor M.A. Quilliam and Professor B. E. McCarry, McMaster University

LIAISON OFFICER OR SUPERVISOR: D. Corr and O. Meresz

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

OBJECTIVE: To determine whether nitro-PAHs are a significantly hazardous constituent of auto exhaust and urban air.

DESCRIPTION:

Nitro-PHAs will be synthesized and used as standards to develop analytical methodology. This methodology will then be used to examine auto exhaust and urban air for the presence of these compounds.

DURATION OF PROJECT: 4 YEARS — PRESENT YEAR IS 2 YEAR — REPORTING DATE annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	23,033 (2 yrs)	20,088	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-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: 11th July 1980

PROJECT TITLE: Tomato and Cucumber Responses to Air Pollution in Southern Ontario

KEY WORDS: Phytotoxicology, ozone

PRINCIPLE INVESTIGATOR AND AFFILIATION Professor D. Ormrod

LIAISON OFFICER OR SUPERVISOR S. Linzon

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

OBJECTIVE:

To determine optimum protection strategy against ozone for tomato and cucumber crops.

DESCRIPTION:

The effects of ozone, chemical protectants, location and cultivar type will be measured and correlated with yield and visible leaf injury for tomato and cucumber crops.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	19,405(2 yrs)	10,025	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: July 1980

PROJECT TITLE:
Investigation of the Combustion of Propane in an Atmosphere of Chlorine and Air.

KEY WORDS: Chlorine, Emergency, Combustion

PRINCIPLE INVESTIGATOR AND AFFILIATION: Professor C. E. Holloway, York University

LIAISON OFFICER OR SUPERVISOR: J. Bishop, D. Corr

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

OBJECTIVE:
To discover which toxic compounds are formed in hydrocarbon-chlorine-air flames, so as to better understand tanker accidents and eventually to characterize chlorinated hydrocarbon combustion chemistry.

DESCRIPTION:
An apparatus has been constructed to burn propane in chlorine-air mixtures and the compounds produced will be analyzed using a gas chromatograph - mass spectrometer system.

DURATION OF PROJECT: 1 YEARS — PRESENT YEAR IS 1 YEAR — REPORTING DATE 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$6,000	$6,000	0.5	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

AR-6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July 1980

PROJECT TITLE: Continuous Monitoring of PAN in the Polluted Troposphere

KEY WORDS: PAN, peroxyacetylnitrate, monitoring, oxidant, photochemical smog.

PRINCIPLE INVESTIGATOR AND AFFILIATION: Professor E. Cherniak, Brock University

LIAISON OFFICER OR SUPERVISOR: P. Wong

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

OBJECTIVE:

To determine the chemical kinetics in air of PAN, an important component of phytochemical smog.

DESCRIPTION:

An automated, portable, microprocessor controlled PAN analyzer will be constructed and calibrated. This analyzer will then be used to determine PAN gas phase kinetics.

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
	50,190 (3 yr.)	19,290	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

RESEARCH: Air Resources

DATE: July 1980

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.Beversuorf, University of Guelph

LIAISON OFFICER OR SUPERVISOR: S. Linzon

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

OBJECTIVE: To provide the basic information necessary to breed ozone-resistant white beans.

DESCRIPTION: Functional changes in plant cell membranes will be characterized upon exposure to ozone. Tolerant and susceptible plants will be studied.

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

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
22,020	12,520	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

AR-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July 1980

PROJECT TITLE:
Assessment of Ozone Effects on Potato and the Relationship of Early Blight to Ozone Injury.

KEY WORDS: Phytotoxicology, ozone, potato

PRINCIPLE INVESTIGATOR AND AFFILIATION: Professor G. Hofstra, University of Guelph

LIAISON OFFICER OR SUPERVISOR: S. Linzon

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

OBJECTIVE:
To increase potato yield by improving understanding of ozone damage.

DESCRIPTION:
Ozone injury to different potato cultivars will be assessed and this will be related to early blight and yield loss. Effectiveness of chemical protectants will also be studied.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	14,632	14,632	2	1

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July 1980

PROJECT TITLE:
Incorporation of Ozone Tolerance into Ontario Field Beans

KEY WORDS: Phytotoxicology, ozone, beans.

PRINCIPLE INVESTIGATOR AND AFFILIATION: Profs. W.D. Beversdorf, & B. D. McKersie , University of Guelph

LIAISON OFFICER OR SUPERVISOR: S. Linzon

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

OBJECTIVE:
To generate basic plant population for ozone resistant white beans.

DESCRIPTION:
The ozone tolerance of specific bean populations will be measured and the capability for transferring tolerance characteristics to Ontario field beans will be investigated.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	11,070	11,070	2	1

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

AR-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July 1980

PROJECT TITLE: Feasibility Study for a Novel Aerosol Analysis System.

KEY WORDS: Aerosol, sampling

PRINCIPLE INVESTIGATOR AND AFFILIATION: Professor J. B. French, University of Toronto

LIAISON OFFICER OR SUPERVISOR: N. Hijazi

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

OBJECTIVE:
To determine feasibility of aerosol collection and desorption system matched to TAGA for aerosol adsorbed organics.

DESCRIPTION:
An aerosol delivery system and a prototype electrostatic collection system will be build and tested. The collection system will deposit the aerosol in silicone oil, for subsequent ease of desorption.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	19,465	19,465	2	1

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

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

AR-11

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July 1980

PROJECT TITLE: A New Technique for Monitoring Sulphuric Acid in Air, Using the TAGA System.

KEY WORDS: Monitoring, Sulphuric Acid, TAGA.

PRINCIPLE INVESTIGATOR AND AFFILIATION: Professor J. B. French, University of Toronto

LIAISON OFFICER OR SUPERVISOR: N. Hijazi

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

OBJECTIVE:

To calibrate and demonstrate a real time measurement capability for sulphuric acid (aerosol or gas) in air, down to the 0.1 ug/m^3 level, using TAGA.

DESCRIPTION:

The inlet tube system will be optimized for complete volatilization of H_2SO_4 aerosol, an improved nebulizer will be build for calibration of the system, salt aerosol and soot particle generators will be built and used to test detection capability for aerosol adsorbed sulphuric acid and ambient air sampling will be performed.

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS 3rd YEAR — PROGRESS REPORTS DUE annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	51,236 (3yrs)	19,980	3.5	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-12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: August 1, 1980

PROJECT TITLE: Multielement Analysis of Airborne Particulate Matter by Neutron Activation.

KEY WORDS: Analysis, APM, Neutron Activation

PRINCIPLE INVESTIGATOR AND AFFILIATION Professor D. Burgess, McMaster University

LIAISON OFFICER OR SUPERVISOR D. Corr

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

OBJECTIVE:

Development of advanced neutron activation analysis methods and choice of best filters for use with these methods.

DESCRIPTION:

Dichotomous filters bearing particulate samples will be analyzed. Different filter types will be used, precision and detection limits will be quantified and advanced analysis methods will be attempted, e.g. fast neutron analysis.

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*
$11,233	$11,233	2	1

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Ministry of the Environment
Ontario

AR-13

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July 1980

PROJECT TITLE: The Continuous Sampling and Analysis of Airborne Particulate Matter and Road Dust in a Central Toronto Location

KEY WORDS: Airborne Particulate matter, sampling, analysis

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

LIAISON OFFICER OR SUPERVISOR: J. Bishop and J. Smith

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

OBJECTIVE:

To acquire data on the detailed conposition of airborne particulate matter in central Toronto.

DESCRIPTION:

Airborne particulate will be collected daily, as well as road dust when weather permits. Samples will be analyzed using diffraction powder photographs in an attempt to identify compounds, also analyzed for elemental constitutents.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	34,758 (2 yrs)	15,033	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-14

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July 1980

PROJECT TITLE: Airborne Particulate Organic Matter (APOM)

KEY WORDS: Sampling, organic, APM.

PRINCIPLE INVESTIGATOR AND AFFILIATION: Denis Corr

LIAISON OFFICER OR SUPERVISOR:

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

OBJECTIVE:

To determine requirements for quantitative APOM sampling, currently available or easily modifiable alternatives to Hi Vol sampling and to initiate long term research towards a complete solution.

DESCRIPTION:

Alternatives to HiVol sampling will be investigated in light of Ontario Research Foundation's report on losses of organic matter from filters. Criteria and terms of reference will be developed for R&D contracts.

DURATION OF PROJECT: 1 YEARS — PRESENT YEAR IS 1 YEAR — REPORTING DATE 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		23,000		0.5

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

AR-15

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July 1980

PROJECT TITLE:
Characterization of Airborne Particulate Matter (APM)

KEY WORDS:
APM, sampling, aerosol, dichotomous

PRINCIPLE INVESTIGATOR AND AFFILIATION
D. J. Corr

LIAISON OFFICER OR SUPERVISOR

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

OBJECTIVE:
To investigate new equipment and techniques to supplement or supplant that currently in use, both for special studies and routine network samples.

DESCRIPTION:
State-of-the-art sampling and analytical methods are being investigated to establish the basis for determination of detailed physical and chemical characteristics of APM in the Ontario network. Dichotomous samplers and current methods of APM sampling are being compared, as well as different sample handling and analytical techniques.

DURATION OF PROJECT: 1 YEARS — PRESENT YEAR IS 1 YEAR — REPORTING DATE 1981

BUDGET:

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

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
Jointly with Laboratory Services Branch, Central Region and Environment Canada

REMARKS:

Ministry of the Environment
Ontario

AR-16

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: August 5, 1980

PROJECT TITLE: Long Path Measurement of Atmospheric Gases Using Tunable Diode Lasers.

KEY WORDS: Air Pollutants, Lasers

PRINCIPLE INVESTIGATOR AND AFFILIATION: Professor B. K. Garside, McMaster University

LIAISON OFFICER OR SUPERVISOR: R. Caton

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

OBJECTIVE:

To develop a point monitor for air pollutants using a tunable diode laser, so that concentration gradients and temporal fluctuations in the concentration of atmospheric gases can be measured.

DESCRIPTION:

Single pass and multipass measurements will be made, in particular, short pathlengths with fast correlation times will be investigated. Trade-offs between atmospheric pathlength, sensitivity and correlation time for SO_2 and nitrogen oxides will be evaluated.

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
	$11,500	$11,500	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: No

REMARKS:

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* August 5, 1980

PROJECT TITLE: The Preparation of Polynuclear Aromatic Hydrocarbons as Reference Compounds Required for Monitoring Purposes.

KEY WORDS: PAH, Reference Compounds, Monitoring

PRINCIPLE INVESTIGATOR AND AFFILIATION Professor J. W. Ap Simon, Carleton University

LIAISON OFFICER OR SUPERVISOR O. Meresz

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

OBJECTIVE:

To provide pure samples of a variety of polynuclear aromatic hydrocarbons as reference standards.

DESCRIPTION:

Various synthetic routes, both reported and new are being followed to provide a large number of PAH's.

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
	$47,810	$13,624	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

AR-18

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: August 5, 1980

PROJECT TITLE: An Investigation of the Performance of Dichotomous Samplers as Realistic Respirable Aerosol Samplers.

KEY WORDS: Aerosol, Respirable Particulate, Dichotomous Sampler

PRINCIPLE INVESTIGATOR AND AFFILIATION: Prof. J. Megaw, C.R.E.Q., York University

LIAISON OFFICER OR SUPERVISOR: D. Corr

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

OBJECTIVE:

To build and test a sampler which size separates airborne particles as does a human lung, taking into account temperature and humidity effects.

DESCRIPTION:

The cut-off characteristics of different jet and orifice configurations in size fractionating samplers will be studied, and a humidity and temperature control attachment will be built.

DURATION OF PROJECT: 1 YEARS — PRESENT YEAR IS 1 YEAR — REPORTING DATE 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$18,500	$18,500	1	1

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Ministry of the Environment

AR-19

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: August 5, 1980

PROJECT TITLE: A Continuation of the Study of Plant Community Response to a Pollution Source at WaWa, Ontario: with Special Reference to Mosses and Lichens

KEY WORDS: Phytotoxicology, Sulphur Dioxide,Mosses, Lichens.

PRINCIPLE INVESTIGATOR AND AFFILIATION: Professor Pamela Stokes, Institute for Env. Studies, University of Toronto.

LIAISON OFFICER OR SUPERVISOR: D. Balsillie

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

OBJECTIVE: To determine the effects of low levels of SO_2 on complete plant communities, rather than individual species.

DESCRIPTION: Moss and lichens collected in birch stands near Wawa will be identified and this information will be integrated with existing vascular plant data. The complete data base will then be analyzed by principal component analysis and recifrocal averaging to relate community structure parameters to distance from SO_2 source.

DURATION OF PROJECT: 1 YEARS — PRESENT YEAR IS 1 YEAR — REPORTING DATE 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$9,500	$9,500	1	1

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Ministry of the Environment
Ontario

AR-20

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: August 5, 1980

PROJECT TITLE: An Experimental Study of Negative Ion Chemical Ionization of Polychlorinated Biphenyl Isomers.

KEY WORDS: Chemical Ionization, PCB Isomers.

PRINCIPLE INVESTIGATOR AND AFFILIATION Professor R. E. March, Trent University

LIAISON OFFICER OR SUPERVISOR N. Hijazi

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

OBJECTIVE:

To investigate the chemical ionization processes of polychlorinated biphenyl isomers.

DESCRIPTION:

The reaction of O_2^-, F^- with PCB's and PCB isomers will be studied as well as alternate negative ion chemical ionization agents, e.g. SF_6^- and $C_2H_5O^-$.

DURATION OF PROJECT 1 *YEARS* — *PRESENT YEAR IS* 1 *YEAR* — *REPORTING DATE* 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$15,600	$15,600	1	1

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* May 18, 1980

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

KEY WORDS: air particulates, SEM, EDX, vegetation

PRINCIPLE INVESTIGATOR AND AFFILIATION AAH 7801

LIAISON OFFICER OR SUPERVISOR S. Villard

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:

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* 3rd *YEAR* *REPORTING DATE* Dec. 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	10,000	2,500	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:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Serivces Branch, Water Quality Section *DATE:* May 18, 1980

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 AAH 7802

LIAISON OFFICER OR SUPERVISOR S. Villard

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:

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* Dec. 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	10,000	3,000	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:

REMARKS:

Ministry of the Environment
Ontario

LS-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* May 18, 1980

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 Structu TEM, Light Microscopy

PRINCIPLE INVESTIGATOR AND AFFILIATION AAH 7803

LIAISON OFFICER OR SUPERVISOR S. Villard

RESEARCH CATEGORY:
INTERNAL X — *UNSOLICITED CONTRACT* — *MULTI-YEAR PROJECT* —
GRANT — *SOLICITED CONTRACT* — *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 symtoms 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. Electro 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 ultrastructrual 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 ultrastructual changes resulting from exposure.

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

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
Ontario

LS-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* May 18, 1980

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

KEY WORDS: Asbestos airborne, TEM, Delbag filters,

PRINCIPLE INVESTIGATOR AND AFFILIATION P.J. Roberts AAH 7804

LIAISON OFFICER OR SUPERVISOR S. Villard

RESEARCH CATEGORY:
INTERNAL X — *UNSOLICITED CONTRACT* — — *MULTI-YEAR PROJECT* —
GRANT — — *SOLICITED CONTRACT* — — *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* 2nd. *YEAR* *REPORTING DATE* April 1981

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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality *DATE:* May 18, 1980

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: Z. Balogh FPD 7503

LIAISON OFFICER OR SUPERVISOR: M. Rawlings

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 odor problems. Focus will also be place on the concensus voluntory reference compounds (CVRC's) as approved by the ACS Division of Environmental Chemistry.

DURATION OF PROJECT OPEN *YEARS* *PRESENT YEAR IS* 4 *YEAR* *REPORTING DATE* April 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	3,500	3500	3 months	3 Months

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: Laboratory Services Branch, Water Quality Section *DATE:* May 18, 1980

PROJECT TITLE:
Arsenic interference in the determination of Phosphorus

KEY WORDS: Arsenic, phosphorous

PRINCIPLE INVESTIGATOR AND AFFILIATION W. B. Moody FPD 7701

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 effect 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* 3 *YEAR* *REPORTING DATE* Dec. 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	3,000	2,000	6 months	3 month

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: Laboratory Serivices Branch, Water Quality Section *DATE:* May 18, 1980

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

KEY WORDS: Flow Injection Analysis

PRINCIPLE INVESTIGATOR AND AFFILIATION: J. Crowther FPD 7801

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 equipment.A variety of detectors are also available for Colorimetric, potentiometric, conductimetric and spectrophotometric analyses.

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

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	10,000	9,000	5 mo	4 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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* May 18, 1980

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

KEY WORDS: Chlorophyll

PRINCIPLE INVESTIGATOR AND AFFILIATION M. Rawlings FPD 7802

LIAISON OFFICER OR SUPERVISOR S. Villard

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

OBJECTIVE:
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* April, 1981

BUDGET:

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

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: Laboratory Services Branch, Water Quality Section *DATE:* May 18, 1980

PROJECT TITLE: An Analytical Procedure for Organic Carbon in Waters which may or may not contain Suspended Solids.

KEY WORDS: Organic carbon analysis, Wastewater, Suspended Solids

PRINCIPLE INVESTIGATOR AND AFFILIATION J. Crowther JC 7501

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* *REPORTING DATE* April, 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$18,000		36 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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* May 18, 1980

PROJECT TITLE:
Determination of Bromide by Ion Chromatography

KEY WORDS: Bromide, ion chromatography, precipitation

PRINCIPLE INVESTIGATOR AND AFFILIATION: J. Crowther JC 7902

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 manmade 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* 2 *YEAR* *REPORTING DATE* July, 1981

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? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* May 18, 1980

PROJECT TITLE:
Nutrient tests as Controls for Microbiological Evaluation

KEY WORDS:
Microbiological tests, nutrients, broth strength

PRINCIPLE INVESTIGATOR AND AFFILIATION J. Crowther, A. Burger JC 7903

LIAISON OFFICER OR SUPERVISOR S. Villard, L. Vlassoff

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

OBJECTIVE:

1. To develop a procedure for analysis of ammonia, nitrate and nitrite in bacteriological samples.
2. To evaluate a nitrate procedure for field analysis.
3. To evaluate media requirements for broth strength and test duration.

DESCRIPTION:

Samples are now analyzed using qualitative procedures to estimate the nitrogen changes due to biological activity. Use of the ammonia probe and a new NO_3-NO_2 procedure will simplify our current analytical procedure and may reduce the number of culture tubes and time required for microbacteriological analysis.

Using the ammonia probe, the samples are analyzed for ammonia. The nitrite and nitrate in the sample is then reduced to ammonia and analyzed for ammonia again. Nitrate-Nitrite is obtained by subtraction. Nitrite will be determined by colorimetric procedure. With the analytical procedures in hand, the kinetics and experimental parameters of the current microbiological procedures can be studied.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$5000	5000	0.5	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

LS-12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* May 18, 1980

PROJECT TITLE:
Determination of pH

KEY WORDS: pH measurement, hydrogen ion concentration, electrodes, pH meters

PRINCIPLE INVESTIGATOR AND AFFILIATION J. Crowther, F. Engel JC 7905

LIAISON OFFICER OR SUPERVISOR S. Villard,

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

OBJECTIVE:
To determine hydrogen ion concentration in precipitation samples.

DESCRIPTION:
The dominant cation in precipitation samples for APOS projects is hydrogen ion. To obtain ion balance this ion must be accurately determined. The current procedure of the Precipitation Lab is inadequate.

The approach will be as follows:

Electrodes and pH meters will be evaluated, magnitude of the effect of experimental variables will be estimated; the most practical procedure for accurately determining free hydrogen ion concentration will be selected.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$6000	4000	0.5	0.25

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* May 18, 1980

PROJECT TITLE:
Reference Channel for Low level chloride analysis

KEY WORDS:
Chloride, water analysis, automated, reference channel

PRINCIPLE INVESTIGATOR AND AFFILIATION J. Crowther JC7906

LIAISON OFFICER OR SUPERVISOR S. Villard

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

OBJECTIVE:

To demonstrate the need for a reference channel in low level automated chloride analysis, and to evalute possible blanking systems.

DESCRIPTION:

Chloride is determined colourimetrically at 480 nm, and hence sample colour will introduce errors when % (v/v) sample in stream is large. Secondly many of the natural constituents found in rivers and streams react with ferric ions, and an excess of the latter is present in one of the chloride reagents.

The approach will be as follows:

Set up reference channels; determine chloride with and without blank corrections; compare results with ion chromatography.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$5000	5000	0.5	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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* May 18, 1980

PROJECT TITLE:
Controller for an Automated Ion Chromatograph System

KEY WORDS:
Controller, automation, ion chromatograph

PRINCIPLE INVESTIGATOR AND AFFILIATION M. W. Rawlings MWR 8001

LIAISON OFFICER OR SUPERVISOR S. Villard

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

OBJECTIVE:
To design and implement a controller for the ion chromatograph which will time and control sample injection and a multi-place sampler; will initiate a regeneration cycle at the end of a run; will release the peristaltic pump; will turn off the chart recorder.

DESCRIPTION:

The key to efficient ion chromatography for the Precipitation Lab is automated runs long enough to use the full capacity of the columns. Since this involves after hours running, a system capable of regenerating the columns and shutting down the equipment is required.

A KIM-1 microcomputer will be used to generate the timing and control signals. The control signals will be transmitted via triac drivers, triacs, and/or relays as appropriate. The circuitry will be our design. The chromatographic column valves will be controlled by electrically operated 3-way air solenoid valves.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$3500	3500	0.25	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: Laboratory Services Branch, Water Quality Section *DATE:* May 18, 1980

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 PJR 7702

LIAISON OFFICER OR SUPERVISOR S. Villard

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 and 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.

DURATION OF PROJECT 1.5 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Dec. 1980

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 the Environment
Ontario

LS-16

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* May 18, 1980

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

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

PRINCIPLE INVESTIGATOR AND AFFILIATION P.J. Roberts PJR 7901

LIAISON OFFICER OR SUPERVISOR S. Villard

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 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 distinguish those minerals which may interfere with asbestos identification.
3. To explore the feasibility of employing an image analysis sytem for positive identification of minerals.

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

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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* May 18, 1980

PROJECT TITLE:
Chlorinated Species Measured by the Amperometric Titrator

KEY WORDS:

PRINCIPLE INVESTIGATOR AND AFFILIATION S. Wisz SV 7701

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 measure 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* April 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$6000	3000	4 mo.	2 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-18

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch, Water Quality Section *DATE:* May 18, 1980

PROJECT TITLE:
Tritium analysis in Water Samples, Application of a Standard Method

KEY WORDS: Groundwater, Liquid Scintillation, Tritium

PRINCIPLE INVESTIGATOR AND AFFILIATION P.J. Roberts WLD 8001

LIAISON OFFICER OR SUPERVISOR S. Villard

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

OBJECTIVE:
To develop a lab capability to analyze water samples for tritium by liquid scintillation down to a level of about 5 - 10 T.U.

DESCRIPTION:
Analysis for tritium in groundwater is one of the established methods for aging the groundwater. Groundwater recharged prior to 1953 (i.e. prior to atmospheric thermonuclear testing) is expected to have tritium concentrations below 2.4 T.U. while more recently recharged groundwaters may contain levels greater than hundreds of T.U. It has been suggested that 5 - 10 T.U. can be detected by liquid scintillation methods. The approach will be:

1. Determine proper cocktail; test Beckman Ready-Solv EP and Packard Insta-gel.
2. Determine correct ratio of sample:cocktail.
3. Determine instrument parameters required & sample preparation techniques. (.e.g. distillation, electrolytic enrichment) to obtain sensitivity and precision desired.
4. Determine calibration curve for chosen parameters.

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

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$3000	3000	0.25	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: Laboratory Services Branch, Water Quality *DATE:* May 18, 1980

PROJECT TITLE: Detection of Dissolved Inorganic Carbon at Low PPM Levels using a Continuous Flow Colorimetric Procedure

KEY WORDS: Dissolved Inorganic Carbon; Continuous Flow Colorimetric Analysis.

PRINCIPLE INVESTIGATOR AND AFFILIATION: W. B. Moody WBM 7901

LIAISON OFFICER OR SUPERVISOR: S. Villard

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

OBJECTIVE:

To optimise a low level dissolved inorganic colorimetric procedure to be used for the determination of DIC in lakes surveyed by the Acidic Precipitation in Ontario study (for establishing a background data base and for studying primary productivity in a selected number of lakes).

DESCRIPTION:

High range DIC (0 - 40 ppm) has been measured in the water lab since 1978. The request for low level DIC data has necessitated the development of a linear 0 - 2 mg/L calibration range. A low level channel was developed during the summer of 1979 employing a preliminary method.

The following approach will be used:

1. Optimisation of the preliminary method by studying the effects of pH, time and temperature.
2. Conducting precision, interference and perishability studies.
3. Establishing a standard procedure for the low level DIC system.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	5,000	5,000	0.25	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

LS-20

RESEARCH AND DEVELOPMENT INVENTORY

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 — *UNSOLICITED CONTRACT* — — *MULTI-YEAR PROJECT* —
GRANT — — *SOLICITED CONTRACT* — — *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* 2 *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-21

RESEARCH AND DEVELOPMENT INVENTORY

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 — *UNSOLICITED CONTRACT* — — *MULTI-YEAR PROJECT* —
GRANT — — *SOLICITED CONTRACT* — — *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 organochlorine 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* 2 *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-22

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 GRANT* — X; *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, 1981

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

LS-23

RESEARCH AND DEVELOPMENT INVENTORY

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, 1981

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

LS-24

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services, OTC Section *DATE:* October 1978

PROJECT TITLE: An Investigation of the Occurrence of Chloroalkyl Ethers in Ambient Air

KEY WORDS: Bis (chloromethyl) ether; Chloroalkyl ether; Ambient Air; Carcinogen; Air Pollutant; Industrial Emission

PRINCIPLE INVESTIGATOR AND AFFILIATION E. G. Adamek

LIAISON OFFICER OR SUPERVISOR E. G. Adamek

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

OBJECTIVE: To establish suitable methodology for the sampling and analysis of chloroalkyl ethers, such as carcinogenic bis (chloromethyl) ether, in ambient air at concentration levels as low as 1.0 ppb and less. To investigate whether chloroalkyl ethers are detectable in air samples collected in the vicinity of chemical industry, or in gaseous emissions from such industry. If detected, to determine quantitatively concentration levels of these compounds at selected urban sites in Ontario.

DESCRIPTION: Bis (chloromethyl) ether has been proved to be a powerful carcinogen at extremely low levels. In air, this compound can form when formaldehyde and HCl react at the ppm level, but other chloroalkyl ethers may also be generated in the atmosphere of chemical plants by similar reactions. The Ontario Occupational Health Guidelines established a Threshhold Limit Value (TLV) of 1.0 ppb (over 8 hours) for bis (chloromethyl) ether. It appears that in the absence of analytical data for these compounds in Ontario, determination of chloroalkyl ethers in ambient industrial atmospheres would be desirable.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$7,000	$3,500	.4	.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

LS-25

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES, OTC SECTION *DATE:* SEPTEMBER, 1978

PROJECT TITLE:

Organic Leachates originating from landfill sites.

KEY WORDS: gas chromatography/mass spectrometry, organic contaminants, landfill, leachates.

PRINCIPLE INVESTIGATOR AND AFFILIATION R. Bonner

LIAISON OFFICER OR SUPERVISOR O. Meresz

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

OBJECTIVE: To investigate the nature of organic chemicals that are being "leached" from landfill sites. To identify landfill sites that are in use or have been used in the past, and determine what organic chemicals, if any, are finding their way into the environment from such sites.

DESCRIPTION: A project of this magnitude would necessarily involve close co-operation with the regions, particularly since the major problem would be identifying landfill sites which were heavily used twenty to thirty years ago. The sampling procedure should involve identification of water courses likely to receive leachate from the sites with samples being taken above and below the point at which this might occur. In addition, soil, and perhaps air, samples should be taken from the site itself. At least two samples should be taken from each sampling point.

Water samples would be screened by GC following purging and extraction, and analyzed by GC/MS where necessary. Soil samples would be extracted and subject to a clean-up procedure to remove petroleum products: again screening would be GC, and analysis by GC/MS.

Since the number of sites involved is likely to be large, initial sampling should be performed at sites in the vicinity of heavily populated areas.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* February, 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$40,000	$6,000	1.5	.3

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: 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 preparatio 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 column

DURATION OF PROJECT: 3 YEARS
PRESENT YEAR IS: 2 YEAR
REPORTING DATE: APRIL, 1981

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-27

RESEARCH AND DEVELOPMENT INVENTORY

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

PROJECT TITLE: Analytical Methodology

KEY WORDS: Quality Assurance, Sample preparation, Quantitation, Documentation Standardization

PRINCIPLE INVESTIGATOR AND AFFILIATION Glenys Foster, OTC Section

LIAISON OFFICER OR SUPERVISOR Ron Bonner

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

OBJECTIVE:

1) To develop improved or extended sample preparation methodology
2) To develop quantitation methods for GC/MS
3) To document and standardize methodology, including updating quality assurance procedures.

DESCRIPTION: Commencing with a review and documentation of current practical methodology, experiments will be devised to ensure optimum sensitivity and date quality and to evaluate other techniques for sample preparation. Quantitation techniques will be developed using EPA methods for water as guidelines and will be extended to solid and biological samples.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* Sept. 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$15,000	$7,500	.5	.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

HT 79-01

RESEARCH AND DEVELOPMENT INVENTORY

LS-28

BRANCH: Laboratory Services

DATE: April 11, 1980.

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: 1980-81 YEAR
REPORTING DATE: Dec. 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$30,000	$15,500	0.8	0.4

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

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: November 1979: Capillary columns have been installed in the GC/MS system but were not working at optimum efficiency. This problem was traced to inadequacies of the injector system. The injector has been redesigned and testing of fused silica capillary columns as well as the new injector will begin in November.

Some preliminary testing of fused silica columns for routine pesticide analysis has been done on a borrowed instrument. Anticipated arrival of our capillary GC will be January, 1980, at which time work will continue on capillary development for routine analysis.

January 31, 1980: A 50 meter fused silica column has been installed in the GC/MS; appropriate modifications have been made to the MS interface. The fused silica column works well on a routine basis for speciation of PCB isomers in environmental samples such as stack gases.

Delivery of the capillary GC has been delayed until March 1980.

April 11, 1980: PCB's have been speciated in stack gases and adipose tissue. Work will continue after the hazards laboratory is completed at the end of March 1980.

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Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-29
JO80-02

BRANCH: Laboratory Services Branch

DATE: July 11, 1980

PROJECT TITLE: Evaluation of Capillary GC for routine fish contamination monitoring

KEY WORDS: Capillary Columns, Electron Capture, Fish Analysis

PRINCIPLE INVESTIGATOR AND AFFILIATION: J. Osborne

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

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

OBJECTIVE: To investigate the feasibility of using capillary column for the routine analysis of pesticides, herbicides and other halogenated organics in fish.

DESCRIPTION:

Due to the low resolving capability of packed GC columns, interfer materials may not be fully separated from the compounds of interes Accordingly, the results reported may not be the true value due to presence of these interferences. By use of the capillary columns it may be possible to fully resolve these interferences and provid a more accurate result.

A comparison will be made of the results obtained from fish extrac analysed on both packed and capillary columns for PCB's and other halogenated environmental contaminants.

DURATION OF PROJECT: 1 YEARS — PRESENT YEAR IS 1980-81 YEAR — REPORTING DATE: July 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$8,000.00	$8,000.00	0.5	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

HT 79-04

RESEARCH AND DEVELOPMENT INVENTORY

LS-30

BRANCH: Laboratory Services

DATE: April 11, 1980

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 1980-81 YEAR — REPORTING DATE December 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$24,000	$14,000	1.1	.7

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

IS A REPORT ANTICIPATED? Type of report still undecided

ANTICIPATION BY OTHER MINISTRIES:

REMARKS: November 1979: A method (Dow procedure) for extraction/clean-up of dioxins from fish has been tested and modifications to optimize chromatographic steps is proceeding well. Further testing with spikes of TCDD cannot continue until the hazards lab can be occupied (anticipated March 1980).

Environment Canada
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-31
April 11, 198

BRANCH: Laboratory Services

DATE:

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 1980-81 YEAR — REPORTING DATE: April 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$15,000	$7,500	0.8	0.4

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

IS A REPORT ANTICIPATED? Type of report still undecided

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: November 1979: Results of enzyme activated steam distillation look promising as a method of hydrocarbon removal for GC/MS samples, but recoveries for PCB's and pesticides are not consistant. More work needs to be done in this area.

Several HPLC columns were tried as a method for hydrocarbon/PCB separation. It was found that μNH_2 worked well. It is expected that several other HPLC columns will be tested.

January 31, 1980: Different enzymes, are being tested to improve the efficiency and consistancy of the steam distillation. Work is in progress on the use of HPLC methodology for the separation of hydrocarbons from PCB's in samples such as stack gases and adipose tissue.

Environment Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-32

JO80-01

BRANCH: Laboratory Services Branch

DATE: July 11, 1980

PROJECT TITLE: Development of High Resolution Capillary G.C. methodology for the analysis of chlorinated industrial organics.

KEY WORDS: Chlorinated Industrial Organics - High Resolution Capillary GC/

PRINCIPLE INVESTIGATOR AND AFFILIATION: J. Osborne

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

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

OBJECTIVE: To investigate the use of high resolution capillary columns for the analysis of complex industrial organic waste samples. If proven feasible, the capillary columns will be incorporated into the autom gas chromatographic instruments for routine analysis.

DESCRIPTION:

The regular packed gas chromatographic columns do not have the required resolving capabilities for the analysis of complex industr waste samples. It is proposed to evaluate specific capillary columns of various lengths for:

(a) analysis of complex halogenated organic wastes in environmenta samples

(b) Suitability for automated analysis

DURATION OF PROJECT: 1 YEARS — PRESENT YEAR IS 1980-81 YEAR — REPORTING DATE: April 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$8,000.00	$8,000.00	0.5	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:

MOE 1293 6/76

Environment Canada

RESEARCH AND DEVELOPMENT INVENTORY

LS-33

BRANCH: Laboratory Services

DATE: April 11, 198

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 1980-81 YEAR — REPORTING DATE: N/A

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 —

FINAL REPORT ANTICIPATED?

Type of report undecided

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: November 1979: The Kenics static mixer has been purchased. The successful conclusion of the project depends on manpower availability.

January 31, 1980: No manpower was available, consequently, this Project is in abeyance.

EPS 1297 6/75

BRANCH: Laboratory Services

DATE: April 11th, 1980

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 1980-81 YEAR — REPORTING DATE Oct. 1980

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
$15,000	$2,000	0.5	0.10

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

IS A REPORT ANTICIPATED? Type of report undecided

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: November 1979: A self-study course in digital electronics has been completed.
Design and construction of a programmable controller has been completed and testing of the system is expected to be completed in the near future. Digital drivers for the solenoid valves have been designed.

Environment

RESEARCH AND DEVELOPMENT INVENTORY

ONB 78-02

LS-35

BRANCH: Laboratory Services

DATE: April 11, 1980

PROJECT TITLE:

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

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

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 — 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 1980-81 YEAR — REPORTING DATE: August 1980

BUDGET:

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

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

IS A REPORT ANTICIPATED?
Interim report available later.

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:

EMS 1293 6/76

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.

November 1979: Comparison of the extraction efficiency of organochlorine pesticides by the automated procedure versus that by conventional methods has been completed. Fluid control devices have been investigated and further work is awaiting delivery of solenoid valves, expected in November.

Thorough testing of a programmable laboratory controller developed in the laboratory is proceeding and is expected to be completed within the next month.

January 31, 1980: Evaluation of the system is in progress: this study comprises the control devices mentioned above as well as the programmable controller described under project OWB 7901.

April 11th, 1980: Due to insufficient manpower, this project will be continued in 1980/81. An interim report is expected by August 1980 with subsequent presentation at the Pittsburgh Conference, March 1981.

ENVIRONMENT CANADA

RESEARCH AND DEVELOPMENT INVENTORY

LS-36

BRANCH: Laboratory Services

DATE: April 11, 1980

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 X — GRANT — UNSOLICITED CONTRACT — 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: 1.0 YEARS — PRESENT YEAR IS 1980-81 YEAR — REPORTING DATE: March 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$15,000	$15,000	1.0	1.0

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.

Environment Canada

RESEARCH AND DEVELOPMENT INVENTORY

LS-37

BRANCH: Laboratory Services Branch

DATE: April 11, 1980

PROJECT TITLE: Effect of environmental factors on hyperlipidemia in man.

KEY WORDS: PCB, enzymes, man

PRINCIPLE INVESTIGATOR AND AFFILIATION: George Crawford - Pesticides Section

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

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

OBJECTIVE:

To determine whether PCBs which are known inducers of microsomal enzymes, are associated with hypertriglyceridemia in man.

DESCRIPTION: In an effort to elucidate the Role of environmental factors in artherosclerosis, Dr. Feuer hopes to determine whether PCBs are associated with hypertriglyceridemia in man. As a result of a visit to the Laboratory by Dr. Feuer (U. of T.) a collaboration was arranged whereby the Pesticides Section would analyze 200 adipose tissue and serum samples for PCB over a two year period.

Preliminary studies will be conducted on post-mortem material and bulk serum which will be provided by Dr. Feuer to test the methodologies.
Serum samples will be hexane-extracted, cleaned-up on Florisil and analysed by gas chromatography (GC) with electron-capture detector.
Adipose tissue will be saponified with alcoholic KOH prior to Florisil clean-up and GC analysis.

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS 1980-81 YEAR — REPORTING DATE: January 198

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
$10,000	$5,000	0.50	0.25

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

IS A REPORT ANTICIPATED? Yes, not available at present

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: February 29, 1980 - Preliminary studies have been completed Methodology was modified: instead of alcoholic KOH saponification of tissue, Soxhlet extraction was used.

MOE 1293 6 April 11, 1980 - Project will be continued whenever samples are received from U. of T.

BRANCH: Laboratory Services JO 77-01 DATE: April 11, 19[illegible]

LS-38

PROJECT TITLE: Use of a Florisil cartridge for analysis of pesticides in ambient air

KEY WORDS: Florisil--analysis--pesticides--air

PRINCIPLE INVESTIGATOR AND AFFILIATION: J. Osborne - 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: To extend use of a Florisil cartridge of our own design to the analysis of various classes of pesticides.

DESCRIPTION:

Passage of air through a Florisil cartridge followed by desorption with organic solvent has proven efficient for PCB analysis.

This project will evaluate the efficiency of Florisil adsorption for analysis of organophosphates. Various solvents will be tested for their desorption efficiency.

This technique will then be extended to other classes of pesticides as demand arises.

DURATION OF PROJECT: ——— YEARS PRESENT YEAR IS 1980-81 YEAR REPORTING DATE unknown

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$7,500		0.3	0.3

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

FINAL REPORT ANTICIPATED? Type of report is undecided

PARTICIPATION BY OTHER MINISTRIES:

Project in obeyance due to lack of manpower

REMARKS: May 1979: This project has not been undertaken due to lack of staff.

November 1979: An attempt has been made to extend this procedure to the analysis of HCB, HCBD and HCE in air. Preliminary investigation showed good recovery of HCB.

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

YJ 77-01

LS-39

BRANCH: Laboratory Services

DATE: April 11, 1980

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 - and P. Baulu

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

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

OBJECTIVE:

Evaluate and 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: 3 YEARS — PRESENT YEAR IS 1980-81 YEAR — REPORTING DATE: October 198

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$22,000	$7,500	0.9	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

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.

November, 1979: Evaluation of analytical columns has been completed; a guard column has been evaluated and found to have only a minimal effect on the actual separation of PCB from HCB, op'DDT and other OC's. An automatic injector is being evaluated at present. Backflushing of the analytical column requires evaluation and, if feasible, will reduce analysis time by 50%.

January 31, 1980: Evaluation of a commercial auto-injector has been completed and it was found to perform satisfactorily for our purpose. The hardware for handling the two multi-port valves and their actuators was designed, constructed and tested.

A new analytical column containing the same NH_2-bonded packing in the form of smaller (5 micron), spherical particles, has been evaluated. Tests are in progress to determine the reproducibility of the HCB/PCB/o,p'-DDT split over extended periods of time, and the capacity of the column material to withstand a large number of consecutive sample loads without degeneration. Further study will involve the study of methods of regeneration of the used packing.

April 11, 1980: Report on first phase (column evaluation) has been submitted for publication in J. Chrom. Sci.
Lack of instrumentation and manpower have precluded completion of project during last fiscal year.

RESEARCH AND DEVELOPMENT INVENTORY

LS-40
GC 80-01

BRANCH: Laboratory Services Branch

DATE: April 11, 1980

PROJECT TITLE: Use of proteolytic, lipolitic enzyme (papain) in the extraction of fish tissues for OC/PCB residues.

KEY WORDS: Enzymes, Fish tissues, extraction, OC/PCB

PRINCIPLE INVESTIGATOR AND AFFILIATION: George Crawford _ Pesticide 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 improve and refine fish tissue extraction methodology through use of enzyme to breakdown tissue and cell structures to allow for a more efficient extraction.

DESCRIPTION:

Enzymes are commonly used for digestion of various biological materials. Use of enzymes shoud give better extraction efficiency compared to the column procedure procedure currently in use (better precision, accuracy) due to improved cellular disruption/ dissolution.

Digestion of fish tissues will be performed using papain at proper pH and temperature. The results will be compared to those obtained by the column.

DURATION OF PROJECT: 0.1 YEARS — PRESENT YEAR IS 1980-81 YEAR — REPORTING DATE: N/A

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$1,000	$1,000	0.1	0.1

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

A REPORT ANTICIPATED? No

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

April 11, 1980: Preliminary studies have demonstrated that the enzymatic digestion of fish offers no advantage over the current extraction procedure.

This project has been cancelled.

OS 1993 6/76

of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

OWB 79-03
LS-41

BRANCH: Laboratory Services

DATE: April 11, 1980

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 — UNSOLICITED CONTRACT — MULTI-YEAR PROJECT
GRANT — SOLICITED CONTRACT — 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: N/A YEARS — PRESENT YEAR IS 1980-81 YEAR — REPORTING DATE N/A

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	N/A	N/A	N/A	N/A

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

IS A REPORT ANTICIPATED? No

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:
November 1979: Extensive discussions with the manufacturer of the bellows required for design of this pumping system have indicated that these devices are too costly to compete with commercially available pumps. The project has been cancelled.

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY LS-42

BRANCH: Laboratory Services/Microbiology **DATE:** Feb. 1/80

PROJECT TITLE: Pollution indicator bacteria isolated from raw and drinking water samples of municipal distribution systems by membrane filter (MF) and presence-absence (P-A) tests.

KEY WORDS: Indicator bacteria, bacterial analysis, distribution systems

PRINCIPLE INVESTIGATOR AND AFFILIATION J.A. Clark

LIAISON OFFICER OR SUPERVISOR L.T. Vlassoff

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

OBJECTIVE: To characterize and identify bacterial cultures isolated from municipal raw and drinking water samples. To determine frequencies of bacterial genera in relation to the type of source water and/or degree of water treatment

DESCRIPTION: Bacterial cultures were inoculated into Enterotubes which permitted preliminary identification of certain bacterial types or groups, and final identification of others into bacterial species. The frequency pattern of the various isolates will be characterized by the type of source water and treatment for individual municipalities. Computer programs have been developed for sorting and characterizing over 10,000 isolates.

DURATION OF PROJECT 6 YEARS **PRESENT YEAR IS** 6 YEAR **REPORTING DATE** October 1980

BUDGET: TOTAL DOLLARS — TOTAL PROJECT / CURRENT YEAR $10,000; MAN YEARS — TOTAL PROJECT / CURRENT YEAR

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No.

REMARKS: Characterization of bacterial isolates has been completed for those from the Toronto and London laboratories. Outstanding work remains for the Thunder Bay and Kingston laboratories.

MOE 1293 6/76

Due Oct/80

Ministry of the Environment

LS-43

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES - MICROBIOLOGY

DATE: February 4, 1980

PROJECT TITLE: MICROTOX AND SPIRILLUM VOLUTAN ACUTE TOXICITY TESTS EVALUATION

KEY WORDS: MICROTOX, SPIRILLUM, TOXICITY, EVALUATION

PRINCIPLE INVESTIGATOR AND AFFILIATION: A. QURESHI AND G. LUCK

LIAISON OFFICER & SUPERVISOR: A. BURGER

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

OBJECTIVE:

To evaluate Microtox and Spirillum Volutans tests for assaying acute toxicity of water and effluents

DESCRIPTION: Recently interest and demand are increasing for information on the properties of chemical products and quality of effluents in relation to their toxicity to aquatic life and persistence in the aquatic environment. MOE's study is designed to evaluate suitability and usefulness of Microtox (an acute toxicity analyzer) and Spirillum Volutans tests for assaying the toxicity of water and effluents.

A variety of pure chemicals (toxicants) and effluents will be examined for their levels of toxicity using those two tests. Results will be compared with the standard fish toxicity test.

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

TOTAL DOLLARS: TOTAL PROJECT / CURRENT YEAR — $7,500

MAN YEARS: TOTAL PROJECT / CURRENT YEAR

SOURCE OF FUNDS: REGULAR BUDGET X — FEDERAL — MINISTRY — PROVINCIAL — INDUSTRY — OTHER — PROJECT

IS A REPORT AVAILABLE? Yes (Internal MOE Report)

DUPLICATION BY OTHER MINISTRIES:

PROGRESS: Microtox completed/ Spirillum ongoing Report Sept/80

Ministry of the Environment

LS-44

RESEARCH AND DEVELOPMENT SUMMARY

BRANCH: LABORATORY SERVICES - MICROBIOLOGY

DATE: February 4/80

PROJECT TITLE:

FECAL COLIFORM ISOLATION AND ENUMERATION METHODOLOGY

KEY WORDS: COLIFORM, ENUMERATION, METHODOLOGY

PRINCIPLE INVESTIGATOR AND AFFILIATION: A. Qureshi and G. Luck

PERSON OFFICER & SUPERVISOR: A. Burger

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

OBJECTIVE:

To develop and evaluate a single-step membrane filter procedure for the enumeration of fecal coliforms on mTEC agar

DESCRIPTION:

Fecal coliforms are used in water quality examination and assessment as indicators of fecal contamination. Since problems of different nature are associated with the methods presently available, this study is designed to develop a single-step method that can be used a standard MOE procedure for the enumeration of fecal coliforms on mTEC medium.

Studies will be conducted under different incubation conditions (temperature-time relationships vs recoveries) to develop a single step mTEC procedure which best simulates the two-step mTEC method for fecal coliform enumeration

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS 2nd YEAR — DATE OF STARTING: December 1980

COST: TOTAL DOLLARS — TOTAL PROJECT: — CURRENT YEAR: $7,500 — MAN YEARS — TOTAL PROJECT: — CURRENT YEAR:

SOURCE OF FUNDS: REGULAR WORK X — SPECIAL MINISTRY FUNDING — PROBLEM — PLAN EA FUND — OTHER — PROJECT

IS A REPORT PARTICIPATED? Yes (Internal MOE Report)

PUBLICATION BY OTHER MOE STAFF:

KEYWORDS:

Ministry of the Environment
Ontario

LS-45

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES **DATE:** APRIL 1/80

PROJECT TITLE: Development of Methodology for the Isolation and Identification of viruses from potable and surface waters, sewage effluents and sludge

KEY WORDS: Viruses, isolation, potable water, surface water, sewage effluents, sludge

PRINCIPLE INVESTIGATOR AND AFFILIATION G. Jenkins

LIAISON OFFICER OR SUPERVISOR A. Burger

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

OBJECTIVE:

To develop standard method for recovery of viruses from surface and potable waters

DESCRIPTION:

Available methods (Talc-celite, Duofine cartridge) for the isolation of viruses from surface and potable waters will be evaluated. A standard method will be adopted for those and for sewage influents, effluents, and sludge

DURATION OF PROJECT 2.0 YEARS **PRESENT YEAR IS** 2nd YEAR **REPORTING DATE** March 81

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	25,000	15,000	2.0	1.0

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

BRANCH:

LS-46

RESEARCH AND DEVELOPMENT INVENTORY

Microbiology Section-Laboratory Services

DATE: Feb./80

PROJECT TITLE: Development of the Rosenkranz Test

KEY WORDS: Rosenkranz, E. coli, Pol A, Organic Compounds, DNA damage, bacterial toxicity, water, effluents,sediments

PRINCIPLE INVESTIGATOR AND AFFILIATION D.A. Rokosh

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

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

OBJECTIVE: To modify and assimilate to Rosenkranz test as a means of assaying the bacterial toxicity and DNA modifying activity of pure compounds and samples of water effluent and sediments

DESCRIPTION: The measurement of mutagenic activity in samples is complicated by the concentration of the mutagenic substance and toxicity of the mutagenic or other constituant of the sample. The primary action of most mutagenic substances is an alteration to the target cell's DNA.
The Rosenkran test will detect the potential of a substance to damaged DNA and also provide a measurement of the bacterial toxicity of the substances or, in samples, interfering toxic substances.

1) The Rosenkranz test will be evaluated
2) Alternate methods of measuring the response of this test will be evaluated
3) The Rosenkranz test will be used to measure DNA modifying and toxic activities of compounds identified to the St.Clair River
4) The use of this test to detect DNA modifying activity and toxic activity of water, effluents and sediments and their concentrations will be evaluated

DURATION OF PROJECT 0.5 year *YEARS* *PRESENT YEAR IS* July/79 *YEAR* *REPORTING DATE* Aug/80

BUDGET:

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

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

IS A REPORT ANTICIPATED? Internal report and report to St.Clair Organic Study Group

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: finished Due Aug/80 part A St.Clair River Report

Ministry of the Environment

Ontario

LS-47

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES - MICROBIOLOGY SECTION **DATE:** FEBRUARY 80

PROJECT TITLE: Development of Screening System to Asses Mutagenicity of Waters, Effluents and Sediments

KEY WORDS: Water, Effluents, Sediments, Mutagenicity, Carcinogenicity,

PRINCIPLE INVESTIGATOR AND AFFILIATION D.A. Rokosh Project Number DR 7802

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

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

OBJECTIVE: To develop concentration methodologies, in cooperations with the OTC Section (see JP 7806) for mutagenic substances in environmental samples.
To develop methodologies to detect the mutagenic activity of environmental samples and concentrates of these samples.

DESCRIPTION:

Organic analyses of industrial effluents and their receiving waters have detected compounds which potentially are mutagenic.
Mutagenic activity has been detected in some pure organic compounds.
There is a need for the development of screening methods for the detection of mutagenic activity in environmental samples.
A method of detecting mutagenic activity in pure compounds has been developed. In conjunction with the OTC section, methods of concentrating mutagenic substances and the compatability of these concentrates to mutagenicity screens will be evaluated.
Mutagenic activity in concentrates of water, effluent and sediment samples obtained from the St.Clair River will be measured

DURATION OF PROJECT 2 yrs YEARS **PRESENT YEAR IS** Sept.78 YEAR **REPORTING DATE** July/80

BUDGET:

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

SOURCE OF FUNDS: Internal

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

IS A REPORT ANTICIPATED?
Report to St.Clair Organics Study Group

PARTICIPATION BY OTHER MINISTRIES:
Biohazards Unit, Microbiology Section

REMARKS:

Finished Report due Aug/80 part of St.Clair River Project

Ministry of the Environment

LS-48

RESEARCH AND DEVELOPMENT SUMMARY

BRANCH: LABORATORY SERVICES - MICROBIOLOGY

DATE: June 1/80

PROJECT TITLE:

ONTARIO M.O.E. UNIVERSITY OF TORONTO VIRAL EPIDEMIOLOGICAL STUDY OF BEACHES, RECREATIONAL WATERS, AND S.T.P. EFFLUENTS

KEY WORDS:

VIRUSES, EPIDEMIOLOGY, BEACHES, RECREATIONAL WATERS, EFFLUENTS

PRINCIPLE INVESTIGATOR AND AFFILIATION: G. Jenkins

LIAISON OFFICER & SUPERVISOR: A. Burger

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

OBJECTIVE:

To examine recreational waters and effluents for the presence of enteric viruses

METHODOLOGY:

Selected beaches on the Great Lakes and recreational waters will be sampled and analyzed for viruses. Effluents from sewage treatment plants impacting on these areas will also be sampled and analyzed. If possible, results will be tied in with bacteriological and epidemiological data analyzed by the University of Toronto

DURATION OF PROJECT: 1.5 YEARS

PRESENT YEAR IS 0.5-1.5 YEAR

ESTIMATED COMPLETION DATE: March 1981

COST IN: TOTAL PROJECT DOLLARS: 35,000

CURRENT YEAR DOLLARS: 25,000

MAN YEARS: TOTAL PROJECT: 2.0

MAN YEARS: CURRENT YEAR: 1.3

TYPE OF WORK: REGULAR PROGRAM — SPECIAL MINISTRY FUNDING — PLANNED — CURRENT X

IS A REPORT ANTICIPATED?

yes (Interim Report - produced March/80)

REVIEW BY OTHER MINISTRIES:

no

COMMENTS:

Project funded through the University of Toronto

Ministry of the Environment

Ontario

LS-49

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services

DATE: May 28, 1980

PROJECT TITLE: Determination of thallium in environmental samples by differential pulse anodic stripping voltammetry (DPASV)

KEY WORDS: Thallium, DPASV, environmental samples

PRINCIPLE INVESTIGATOR AND AFFILIATION R.S. Sadana RS 80-1

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 sensitive method for total thallium, Tl^{+} and Tl^{3+} in a variety of samples. To investigate and eliminate possible interferences by the use of complexing and reducing agents.

DESCRIPTION:

Thallium is a highly toxic metal. Currently, the ITC section does not have an acceptable method for determination of thallium at parts per billion concentrations. Measurable amounts of thallium have been detected in samples such as emissions from cement plants and some effluents and mine tailings.

APPROACH: A DPASV analytical method will be developed. Reducing and complexing agents will be used to eliminate lead, cadmium and iron interferences. Speciation of thallium will be attempted. Precision and accuracy will be established.

DURATION OF PROJECT 75 man days *PRESENT YEAR IS* ——— *YEAR* *REPORTING DATE* ———

BUDGET: $7500 *TOTAL DOLLARS* *TOTAL PROJECT* *CURRENT YEAR* *MAN YEARS* *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: No

REMARKS:

Ministry of the Environment

Ontario

LS-50

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services

DATE: May 28, 1980

PROJECT TITLE:

Speciation of Chromium in Liquid Environmental Samples

KEY WORDS:

Chromium, metal speciation, waste water, sewage DPP

PRINCIPLE INVESTIGATOR AND AFFILIATION

R.S. Sadana and P.N. Vijan RS-PV 80-3

LIAISON OFFICER OR SUPERVISOR

J.N. Bishop

RESEARCH CATEGORY:

INTERNAL X — *GRANT* ——

UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* ——

MULTI-YEAR PROJECT ——

CONCURRENT PROJECT ——

OBJECTIVE:

To differentiate and determine trivalent and hexavalent forms of chromium. To establish the validity of the method.

DESCRIPTION:

Of the two ionic species of chromium, the hexavalent form is toxic. Present colourimetric method for Cr^{6+} is subject to interferences. DPP method is free from such interferences and measures the two forms in the same sample aliquot.

APPROACH: A suitable electrolyte will be selected to determine Cr^{6+}. Subsequently Cr^{3+} will be oxidized, in situ, to Cr^{6+} and redetermined. The results will be compared with those obtained by colourimetry and AAS. Accuracy, precision and interference studies will be undertaken.

DURATION OF PROJECT 75 man days

PRESENT YEAR IS —— *YEAR*

REPORTING DATE ——

BUDGET: $7500

TOTAL DOLLARS — *TOTAL PROJECT* — *CURRENT YEAR*

MAN YEARS — *TOTAL PROJECT* — *CURRENT YEAR*

SOURCE OF FUNDS:

REGULAR WORK PROGRAM ——

SPECIAL MINISTRY FUNDING ——

JOINTLY FUNDED PROJECT ——

OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Ministry of the Environment

Ontario

LS-51

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services

DATE: May 28, 1980

PROJECT TITLE:

Determination of metals in dustfall samples by emission spectrography

KEY WORDS: Dustfall, metals, emission spectrometer, DC arc

PRINCIPLE INVESTIGATOR AND AFFILIATION Dave Boomer and Dave Sturgis DB-DS 80-1

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 emission spectrographic procedure for multielement analysis of dustfall samples.

DESCRIPTION:

Elemental composition of dustfall sample collected in the vicinity of a polluting industry may provide information leading to source identification. Commonly used acid digestion procedures are inadequate and time consuming for complete extraction of all the metals. D.C. arc excitation of powdered sample allows measurement of total metals content.

APPROACH: The parameters affecting sample introduction and excitation in the D.C. arc as well as spectral interferences, sensitivities, accuracy and precision will be studied and optimized. Effects of variable sample matrices on analytical channels will be examined.

DURATION OF PROJECT 45 man days *YEARS* — *PRESENT YEAR IS* ——— *YEAR* — *REPORTING DATE* ———

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$4500			

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-52

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services

DATE: May 28, 1980

PROJECT TITLE: Application of GC-AAS Technique to Alkyl Lead Speciation

KEY WORDS: G.C., AAS, speciation, lead

PRINCIPLE INVESTIGATOR AND AFFILIATION P.N. Vijan and B.P. Neary PV - BN 80-1

LIAISON OFFICER OR SUPERVISOR J.N. Bishop

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

OBJECTIVE:

To adapt a GC-AAS method for the determination of alkyl lead species in environmental samples and to select an optimum extraction procedure.

DESCRIPTION:

The current GC method using electron capture detector is non specific and unreliable. On the other hand AAS is sensitive as well as specific for lead.

APPROACH: Various parameters effecting the extraction separation and measurement of alkyl lead compounds will be optimized. Heated quartz cell will be used to atomize lead in the G.C. effluents. Recovery studies will be carried out. Sensitivity, accuracy and precision of the method will be established.

DURATION OF PROJECT 50 man days *PRESENT YEAR IS* ——— *YEAR* *REPORTING DATE* ———

BUDGET: $5000

	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: No

REMARKS:

Ministry of the Environment

Ontario

LS-53

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services

DATE: May 28, 1980

PROJECT TITLE: Determination of free and complexed cyanides as well as thiocyante - cyanide speciation, using a gas dialysis technique.

KEY WORDS: Gas dialysis, membrane, cyanides, thiocyanate, speciation

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. J.C. Hipfner JH 80-1

LIAISON OFFICER OR SUPERVISOR: J.N. Bishop

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

OBJECTIVE:

To analyse liquid environmental samples for thiocyanate, free and complexed cyanides. To evaluate the efficiency of different types of membranes for the separation of these species.

DESCRIPTION:

Gas dialysis membranes are hydrophobic and have been used to separate gaseous components, such as Co_2 and HCN from continuously flowing liquid streams.

APPROACH: Various membranes will be tested for separation efficiency, specificity and durability. Speciation of thiocyanate, free and complexed cyanides will be attempted. Technicon dialysis and colourimetric apparatus will be used. Interference and recovery studies will be carried out. Accuracy and precision of the method will be established.

DURATION OF PROJECT 60 man days *PRESENT YEAR IS* ——— *YEAR* *REPORTING DATE* ———

BUDGET: $6000

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

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

IS A REPORT ANTICIPATED? Yes - possible publication

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

LS-54

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services

DATE: May 28, 1980

PROJECT TITLE: Characterization of lead bearing particles in the vicinity of a lead smelting plant.

KEY WORDS: Lead, analysis, particle, dichotomous sampler, microscopy

PRINCIPLE INVESTIGATOR AND AFFILIATION: J.A. Pimenta JP - 80-1

LIAISON OFFICER OR SUPERVISOR: J.N. Bishop

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

OBJECTIVE:
To distinguish between the lead bearing suspended air particulate matter emitted by automobiles and those from the stack of a lead smelter.

DESCRIPTION:
A large portion of lead in ambient air is caused by auto exhaust emissions. This may not be true in the vicinity of a lead smelter. The lead bearing particles from automobiles are generally much smaller than those from smelter stack.

APPROACH:
Lead bearing particles will be separated into two size fractions, < 2.5 µm and >2.5 µm, by means of a Dichotomous sampler. Morphology and chemical composition of the particles in the two fractions will be studied. Both fractions will also be analyzed for lead.

DURATION OF PROJECT: 75 man days

PRESENT YEAR IS ——— *YEAR*

REPORTING DATE ———

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$7500			

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-55

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services

DATE: May 28, 1980

PROJECT TITLE:

Speciation of arsenate and arsenite in waters

KEY WORDS: DP. Polarography, speciation, Hydride - AAS

PRINCIPLE INVESTIGATOR AND AFFILIATION R.S. Sadana and P.N. Vijan RS - PV 80-2

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 method for determination of the two forms of arsenic in waters. To establish validity of the method and to apply it to natural waters.

DESCRIPTION:

Arsenite is relatively more toxic than arsenate. Currently there is no method available in L.S.B. to distinguish between the two forms. Arsenate ion is known to be electroinactive.

APPROACH: As^{3+} will be determined by DPP

As^{5+} will be reduced to AS^{3+} and the total arsenic will be determined

The same experiments will be repeated using hydride - AAS as a measurement technique. Various reducing agents will be evaluated. Accuracy and precision of the developed method will be established.

DURATION OF PROJECT 75 man days *PRESENT YEAR IS* —— *YEAR* *REPORTING DATE* ——

BUDGET: $7500 *TOTAL DOLLARS* *TOTAL PROJECT* *CURRENT YEAR* *MAN YEARS* *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: No

REMARKS:

BRANCH: Laboratory Services

PROJECT TITLE: Microbiology Acidic Precipitation Study Objectives

ACID PRECIPITATION STUDY

KEY WORDS: MICROBIAL TRANSFORMATIONS, SULFUR, NITROGEN, CARBON, ACID PRECIPITATION, ORGANIC DECOMPOSITION

PRINCIPLE INVESTIGATOR AND AFFILIATION: L.T. Vlassoff / J.E. Pagel / M. Young / K. Lautenschlager

LIAISON OFFICER OR SUPERVISOR: L. T. Vlassoff

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

OBJECTIVE:

To determine the role and activities of microorganisms in cycling sulfur, carbon and nitrogen in areas affected and unaffected by acid precipitation. To measure the effect of acid precipitation on the decomposition of organic matter.

DESCRIPTION:

Following a literature review, the presence of the major groups of sulfur and nitrogen cycl bacteria will be determined in carefully selected susceptible and less susceptible acidifie lakes and in non-acidified control lakes. This will be completed in the first year. Durin this period methods will also be developed and implemented in situ to determine the level activity of these organisms. Measurement of microbiological transformations will continu for three to five years. Measurement of the decomposition rate of organic matter will star in the first year at lake, stream and soil sites. The contribution by the microbial flora t sulfur and nitrogen emissions to the environment will be evaluated. All active microbi systems will be carefully scrutinized with a view to reclamation. The significance of t changes in rate of decomposition of organic matter in variously affected lakes will b investigated. The kinetics of sulfur, nitrogen and carbon movement throughout th ecosystem will be addressed. Lakes where some form of reclamation has been tried will b evaluated.

DURATION OF PROJECT: 5 YEARS March 31/85 — PRESENT YEAR IS April 1 1980 YEAR — REPORTING DATE

TOTAL DOLLARS: TOTAL PROJECT — CURRENT YEAR 100 000

MAN YEARS: TOTAL PROJECT — CURRENT YEAR 2.5

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

IS A REPORT ANTICIPATED? Seasonal reports and March annual reports

ANTICIPATION BY OTHER MINISTRIES:

REMARKS: Some chemical analysis will be required

Ministry of the Environment

Ontario

LS-57

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* July 30, 1980

PROJECT TITLE:
An Automated Determination of Ammonia by Gas-Phase Sampling and Molecular Absorption

KEY WORDS:
Ammonia, Gas-Phase, Automated, Molecular Absorption

PRINCIPLE INVESTIGATOR AND AFFILIATION: G. Wood GW-PV 8002

LIAISON OFFICER OR SUPERVISOR: P. Vijan

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

OBJECTIVE:
To develop a method for the determination of ammonia in a variety of matrices.

DESCRIPTION:
A Technicon Auto-Analyzer pump will be used to mix the sample matrix with a basic solution. The ammonia evolved will be separated in a gas-liquid separator and swept by an argon stream into an open ended cell mounted on a Varian model AA-5 Atomic Absorption Spectrophotometer, filled with an Arsenic lamp and tuned to a wavelength of 193.7 nm. The absorbance signal will be monitored on a strip chart recorder.

DURATION OF PROJECT: 60 Man Days *PRESENT YEAR IS* 1 st *YEAR* *REPORTING DATE:* Dec./80

BUDGET:

	TOTAL DOLLARS		MAN Days	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$6000	$6000	60	60

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

PAC #1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee *DATE:* June 9, 1980

PROJECT TITLE: The efficacy of controlled droplet applicators for herbicides.

KEY WORDS: Controlled droplet - Herbicides

PRINCIPLE INVESTIGATOR AND AFFILIATION Professor Glen W. Anderson
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 use a lab model controlled droplet applicator to determine the maximum allowable droplet spacing and herbicide concentration with 150 micrometer or larger droplets. Soil incorporated herbicides will be studied initially.
2. To use available field model controlled droplet applicators to assess weed control and crop safety compared to present methods of herbicide application. Three preplant incorporated, 3 pre-emergence and 3 post-emergence herbicides will be studied initially.

DESCRIPTION:

To realize these potential improvements in herbicide application it is necessary to collect data which would give sufficient confidence to allow the registration of herbicides to be used with this technique. These studies must include an assessment of the limits of droplet spacing and herbicide concentration allowable of each weed control situation.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress Report December 1980

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 Ontario Pesticides Advisory Committee.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PAC #2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee *DATE:* June 9, 1980

PROJECT TITLE: A Study of resistance by the German Cockroach Blattella Germanica, (L.) in the Toronto area to insecticides and the effectiveness of these chemicals in control.

KEY WORDS: German Cockroach - Resistance - Insecticides

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. W.D. Blaine
Chemical Research International

LIAISON OFFICER OR SUPERVISOR Ontario Pesticides Advisory Committee

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

OBJECTIVE:

The proposal is to continue tests for resistance by the German cockroach to insecticides. Two strains of roaches being cultured, one called the University strain has not been exposed to insecticides, while the other collected from apartment buildings in Toronto has presumably been exposed in the past. Several insecticides will be tested.

DESCRIPTION:

New strains of roaches will be obtained from food handling establishments, where spraying is done on a continual basis. It is these areas where resistance is most likely to develop and also where it will reach its highest levels. Chemicals to be tested include diazinon, dursban, baygon and ficam. The method used will be topical application of technical material. Chemicals showing the most promise will be tested at various locations throughout the metro Toronto area.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress Report December 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$11,000	$5,000		

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

IS A REPORT ANTICIPATED? Report prepared annually by the Ontario Pesticides Advisory Committee.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee *DATE:* June 9, 1980

PROJECT TITLE: The economic significance of Potato Leafhoppers in new seedings of alfalfa.

KEY WORDS: Potato leafhopper - Alfalfa - Economic significance

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. C.R. Ellis
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. Obtain one more year of data on the effect of potato leafhoppers on yield and quality of alfalfa under field conditions.
2. Do cost/benefit analysis of the additional fields investigated in 1980.
3. Obtain a second year data on the effect of leafhoppers the year of planting on winter survival and yield and quality the second year (by a follow-up study of the fields used in 1979).
4. Analyze the three years of data for crop losses in relation to leafhopper numbers and develop economic thresholds.
5. Analyze the data for the relationship between date of planting, rainfall, etc. and severity of crop losses to determine how these factors influence the economic threshold.

DESCRIPTION:

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.

Final year of testing.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* Progress Report December 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$26,800	$6,500		

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

IS A REPORT ANTICIPATED? Report prepared annually by the Ontario Pesticides Advisory Committee.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PAC #4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee

DATE: June 9, 1980

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
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 whether the use of mercurial fungicides for disease control in turfgrass constitutes a significant environmental hazard, and to provide experimental evidence that restricted use of these materials is justified, or otherwise.

DESCRIPTION:

1. Repeat sampling of the old sites as in 1979 for additional data on distribution of residues both vertically and laterally with special attention to soil type and surface drainage. Lateral sampling to be extended beyond the 10 m used in 1979 which did not determine the limits of lateral distribution of residue.

2. Monitor accumulation of residues in and around new turfgrass areas subjected to a mercurial fungicide program beginning in 1979. Two experimental areas were placed on this program in 1979, one at the Cambridge Research Station and the other at the Cutten Golf Club. One half of the area at each site was treated with Mersil, to represent inorganic mercury, and the other half with PMAS, to represent organic mercury. Treatments were made in mid-summer and late fall. Samples were taken before treatment began and 2 weeks after the fall treatment.

The plan is to sample again in early spring, before treatments begin for 1980, proceed with a preventive schedule of fungicide applications throughout the season, then sample again in the late fall to determine changes in mercury residue accumulation in in and around the treated areas. Final year of study.

DURATION OF PROJECT 3 *YEARS* — *PRESENT YEAR IS* 3rd *YEAR* — *REPORTING DATE* Progress Report December 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$19,800	$8,000		

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

IS A REPORT ANTICIPATED? Report prepared annually by the Ontario Pesticides Advisory Committee.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PAC #5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee *DATE:* June 9, 1980

PROJECT TITLE: Control of mosquitoes in Ontario with planarian flatworms.

KEY WORDS: Mosquitoes - Catch basins - Planarian flatworms

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. John A. George
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 control mosquitoes in Ontario with planarian flatworms.

DESCRIPTION:

1. Publish the data obtained in 1979.
2. Expand rearing, and field trials, to determine the proportion of catchbasins that will maintain planaria.
3. Determine what proportions of planaria populations come to sytrofoam floats and what are the conditions that effect their presence on floats.
4. By introducing known numbers of egg rafts and planaria into simulated catch-basins, determine the effects of planaria on the numbers of Culex adults that reach ecolosion. (Suggested by Gord. Surgeoner).
5. Determine if D. tigrina play a role in reducing spring and summer Aedes in temporary pools (underway).
6. Determine if Mesostoma ssp. occur in Ontario.
7. Devise a biochemical test to measure the biomass of planaria. This will permit many other tests, such as what determines bud sizes, and what is the best food? (underway).

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress Report December 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$17,800	$12,000		

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

IS A REPORT ANTICIPATED? Report prepared annually by the Ontario Pesticides Advisory Committee.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PAC #6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee

DATE: June 9, 1980

PROJECT TITLE: Effects of insect growth regulators and new candidate larvicides on blackfly larvae and non-target aquatic invertebrates.

KEY WORDS: Insect growth regulators - Micro-encapsulation larvicide agent - Black fly larvae - Aquatic invertebrates

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. N.K. Kaushik, 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 effects of insect growth regulators and new candidate larvicides on black fly larvae and non-target aquatic invertebrates.

DESCRIPTION: Since very encouraging results have so far been obtained with the use of diflubenzuron, the emphasis of research would be to assess the effects of this substance on blackfly larvae and on non-target organisms. Thus the main objectives are:

a) To study under laboratory conditions effects of diflubenzuron on non-target stream invertebrates.

b) To complete analysis of nearly 200 samples of non-target stream invertebrates collected during the last year's treatment of three streams in the Adirondack area.

c) Investigation of a field sampling technique for blackfly larvae.

DURATION OF PROJECT: 4 *YEARS* — *PRESENT YEAR IS:* 4th *YEAR* — *REPORTING DATE:* Progress Report December 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$28,700	$5,500		

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

IS A REPORT ANTICIPATED? Report prepared annually by the Ontario Pesticides Advisory Committee.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PAC #7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee

DATE: June 9, 1980

PROJECT TITLE: To complete the computer model of diquat in aquatic systems.

KEY WORDS: Diquat - Aquatic systems - Computer model.

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. C.I. Mayfield
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 complete the computer model of Diquat in aquatic systems.

DESCRIPTION:

A restricted series of experiments are required to complete the model of Diquat in aquatic systems. They are:

1. The fate of the photolytic decomposition products of diquat (mainly picolinamide).
2. The biodegradation of these materials.
3. Some restricted studies on the toxicity of these materials to aquatic systems (not required for the model) if the previous two areas indicate that the photolysis products are likely to be significant and persistent in the system.

Final year.

DURATION OF PROJECT 3 *YEARS*

PRESENT YEAR IS 3rd *YEAR*

REPORTING DATE Progress Report December 1980

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$15,000	$1,000		

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

IS A REPORT ANTICIPATED? Report prepared annually by the Ontario Pesticides Advisory Committee.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PAC #8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee *DATE:* June 9,1980

PROJECT TITLE: The economics benefits to growers of pest monitoring in Onion & Carrot production in the Holland and Keswick marshes.

KEY WORDS: Economic assessment - Pest monitoring - Onion & Carrots.

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. W.C. Pfeiffer, University of Guelph
Mr. M. Stemeroff, " " "

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 collect cost of production data from the same sample of growers who co-operated in the study during 1979.
2. To analyze the impact on overall economic efficiency which pest monitoring has had on those farms where IPM has been recently adopted.
3. To compare the economic impacts across farms in the sample where the managerial styles exhibited by the operators are different.
4. To validate the "decision tree approach" as a means by which an individual grower could compare his economic performance in any year with his past performance.

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 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress Report December 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$15,400	$8,000		

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

IS A REPORT ANTICIPATED? Report prepared annually by the Ontario Pesticides Advisory Committee.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PAC #9

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee *DATE:* June 9, 1980

PROJECT TITLE: Determination of the physiological threshhold for control of the spotted tentiform leafminer on apple trees.

KEY WORDS: Physiological threshold - insects - apples.

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. J.T.A. Proctor, University of Guelph
Dr. J.W. Laing, " " "

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 physiological threshold for control of the spotted tentiform leafminer on apple trees.

DESCRIPTION:

1. Populations of spotted tentiform leafminer are present in University Research Orchards, on growers farms, and are being cultured in the laboratory on greenhouse grown trees.
2. Studies of healthy and insect damaged apple trees will be continued as follows:-
   (a) The net carbon dioxide assimilation of apple trees with different population levels of leaf miner will be measured by infra-red gas analysis.
   (b) Other physiological measurements such as dark respiration, transpiration, chlorophyll content, leaf water potential and stomatal conductance will be made.
3. An orchard survey will be continued to assess the extent of damage by this insect. Representative cultivar/rootstock combinations will be selected and vegetative growth, flowering, and fruiting measured over a two year period.
4. Nutrient status of healthy and damaged trees will be determined.
5. Data from 2,3 and 4 will be integrated and analyzed and used with other data from other workers to establish control measures for this insect.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* ~~Progress Report~~ December 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$15,500	$7,500		

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

IS A REPORT ANTICIPATED? Report prepared annually by the Ontario Pesticides Advisory Committee

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PAC #10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee *DATE:* June 9, 1980

PROJECT TITLE: Development of sex attractant traps for monitoring changes in low density spruce budworm population as a means of implementing early intervention management strategies.

KEY WORDS: Spruce Budworms - Population - Sex attractant traps.

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. C.J. Sanders
The Sault College of Applied Arts and Technology

LIAISON OFFICER OR SUPERVISOR ONTARIO PESTICIDES ADVISORY COMMITTEE

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

OBJECTIVE:

To correlate changes in the numbers of male spruce budworm captured each year in sex attractant traps with changes in spruce budworm population density.

DESCRIPTION:

If the control of budworm is to progress beyond the stage of crop protection by chemical insecticides, a means is needed to prevent the budworm from reaching epidemic proportions, and also the development of alternative methods that are ecologically and economically acceptable. Such strategies for control of the spruce budworm will depend for their success on the early identification and detection of incipient outbreaks.

In between outbreaks, spruce budworm populations exist at extremely low density, and conventional sampling techniques, such as the collection and examination of branches to count larvae or egg masses, are extremely time-consuming and expensive. But prevention of outbreaks requires the detection of population increases at these low densities, and it is towards this end that this proposal is aimed.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	?	$13,000		

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

IS A REPORT ANTICIPATED? Report prepared annually by the Ontario Pesticides Advisory Committee.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PAC #11

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee *DATE:* June 9, 1980

PROJECT TITLE: Honey Bee poisoning hazards on sweet corn in Ontario.

KEY WORDS: Honey bees - Poisoning - Sweet corn.

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. M.V. Smith
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 determine the extent to which honey bees contact pesticides when gathering sweet corn pollen.
2. To study ways of reducing this environmental hazard to foraging honey bees.

DESCRIPTION:

1. Determine the relative amounts of sweet corn pollen collected before and after pesticide applications and any repellency from the spray treatments.
2. Bioassays to determine whether toxic amounts of pesticides are present and repeat at intervals to determine how persistent are the toxic effects.
3. Observe the foraging behaviour of pollen-gathering bees on sweet corn.
4. Experiment with modified spray target deposition.

DURATION OF PROJECT 1 YEARS *PRESENT YEAR IS* 1st YEAR *REPORTING DATE* Progress Report December 1980

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 the Ontario Pesticides Advisory Committee.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PAC #12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee *DATE:* June 9, 1980

PROJECT TITLE: Reduction of herbicidal drift with a micromax field crop sprayer.

KEY WORDS: Herbicide drift - Reduction - Micromax sprayer.

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. G.R. Stephenson
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: Spray drift continues to be one of the most serious problems associated with herbicide use in Ontario. To compare the spray drift resulting from a low volume Micromax CDA sprayer with that resulting from conventional methods - under actual field conditions.

If this equipment does in fact reduce spray drift, the testing proposed in this project will be essential for the development of use recommendations in Ontario.

DESCRIPTION:

The Micromax sprayer is a low volume sprayer which is capable of delivering sprays with a relatively narrow range of droplet sizes. The droplets of uniform size are generated by rotary atomization whereby the spray solution is released onto and then projected from a spinning disc. The rotational speed (rpm) of the spinning disc can be altered from low (2000 rpm) to high (5000 rpm) speeds to produce 250 micron or 75 micron droplets, respectively. Each spinning disc unit can cover a swath up to 6 feet in width and several units can be spaced accordingly on a boom for field crop spraying.

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

BUDGET:

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

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

IS A REPORT ANTICIPATED? Report prepared annually by the Ontario Pesticides Advisory Committee.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

of the Environment
Ontario

PAC #13

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee *DATE:* June 9, 1980

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, University of Guelph
Dr. B.V. Helson, " " "

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. Advise 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 guidelines for control.
6. To conduct what research is necessary to develop effective methods for reducing nuisance problems with blackflies and other biting flies.
7. To evaluate control devices promoted for consumer use.

DURATION OF PROJECT Continuing —— *YEARS* *PRESENT YEAR IS* 5th —— *YEAR* *REPORTING DATE* Progress Report December 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$250,000	$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 has been for the past three years a responsibility of the Pesticides Advisory Committee.

Ministry of the Environment
Ontario

PAC 14

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee *DATE:* June 9, 1980

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

KEY WORDS: home garden - pests - companion planting

PRINCIPLE INVESTIGATOR AND AFFILIATION MR. R. T. Wukasch
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. 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 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress Report ~~December 1980~~

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$15,270	$8,270		

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 #15

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee *DATE:* June 9, 1980

PROJECT TITLE: Weather timed fungicide scheme for vegetable crops.

KEY WORDS: Weather - Timing - Fungicides - Vegetable crops

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. T.J. Gillespie, University of Guelph
Dr. J.C. Sutton, " " "

LIAISON OFFICER OR SUPERVISOR: Ontario Pesticides Advisory Committee

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

OBJECTIVE:
1. Develop reliable, cost-effective monitoring instrumentation suitable for use by growers.
2. Develop an integrated spray program for Boytrytis leaf blight and downy mildew of onions.
3. Test available new systemic fungicides for late season carrot blight control, since control at this time is hampered more by spray coverage than spray timing.

DESCRIPTION:

Schemes which have been developed for more efficient fungicide spray timing in carrots and onions, and similar schemes developed by other researchers for tomatoes, apples and potatoes, all require monitoring of environmental temperature and moisture. Grower confidence, and hence participation in these schemes, is enhanced when the necessary environmental data are gathered on the grower's own farm rather than at some central station. Monitoring at the farm level becomes an absolute necessity in complex terrain or near lakeshores.

DURATION OF PROJECT: 1 YEARS
PRESENT YEAR IS: 1st YEAR
REPORTING DATE: Progress Report December 1980

BUDGET:

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

PAC #16

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee *DATE:* June 9, 1980

PROJECT TITLE: Feasibility of using parasites and/or predators in a program of integrated control.

KEY WORDS: Integrated pest management - parasites - onion maggot

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. A.D. Tomlin, University of Western Ontario
Dr. J.H. Tolman

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 identify native parasites and predators of the onion maggot.
2. To identify parasites and predators of the onion maggot occurring in organic soil areas used for vegetable production in southwestern Ontario.
3. To develop a technique for mass production of one important parasite of the onion maggot.
4. To determine the toxicity of insecticides currently recommended for onion maggot control to A. pallipes.
5. To assess the feasibility of using parasites in a program of integrated onion maggot control.

DESCRIPTION:

As above.

DURATION OF PROJECT 1 YEARS *PRESENT YEAR IS* 1st YEAR *REPORTING DATE* Progress Report December 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$12,000	$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:

of the Environment
Ontario

PAC #17

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee *DATE:* June 9, 1980

PROJECT TITLE: Microbial degradation of carbofuran in soil.

KEY WORDS: carbofuran - soil micro-organism - degradation

PRINCIPLE INVESTIGATOR AND AFFILIATION Mr. J.R.W. Miles, University of Western Ontario
Dr. C.M. Tu, " " " "

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, carbofuran, 3-hydroxycarbofuran and 3-ketocarbofuran are degraded by soil microorganisms.

DESCRIPTION:

Little work has been done to define the role of soil microorganisms in the degradation of carbamate insecticides in soil. Carbofuran, a well-known carbamate insecticide, is used quite widely in Ontario for insect control. The recent NSERC report entitled "Carbofuran: Criteria for Interpreting the Effects of its Use on Environmental Quality" noted that there was little information on the role of soil microorganisms on the degradation of carbofuran and recommended initiation of research in this area.

Tests will be conducted under laboratory conditions using microbiological and chemical techniques developed previously which are described in the reprint appended. Residues of carbofuran and it's degradation products will be determined by gas chromatography.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* PROGRESS REPORT December 1980

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

PAC #18

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee *DATE:* June 9, 1980

PROJECT TITLE: Behaviour of aldicarb (Temik(R)) in soil.

KEY WORDS: Insecticide - aldicarb - activity - soil

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. R.A. Chapman, University of Western Ontario
Dr. C.R. Harris, " " " "

LIAISON OFFICER OR SUPERVISOR Ontario Pesticides Advisory Committee

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

OBJECTIVE:

a. Spectrum of insecticidal activity of aldicarb, aldicarb sulfoxide and aldicarb sulfone.

b. Insecticidal activity in soil of aldicarb, (a) sulfoxide and (b) sulfone in relation to soil type, moisture and temperature.

c. Persistence and degradation of aldicarb and its two degradation products under laboratory conditions as measured by chemical analysis and bioassay.

d. Persistence and degradation of aldicarb in mineral and organic soils under field conditions and its uptake by selected indicator crops.

DESCRIPTION:

Aldicarb is a highly toxic systemic carbamate insecticide which is used quite widely in the United States. Because of its high toxicity, registration authorities in Canada were initially very cautious about granting registration, e.g. it was first registered for very limited use in production of flowering plants in greenhouses. Subsequently registration authorities went to the opposite extreme, allowing use of aldicarb on potatoes at application rates of two to three pounds of active ingredient per acre. This registration was granted with, as far as we can determine, very little Canadian data on residues in the crop, and no Canadian data on persistence and degradation in soils. Aldicarb is the most effective systemic insecticide ava.lable for control of potato insect pests and is being used on mineral and organic soils by increasing numbers of potato growers each year.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress Report December 1980

BUDGET:

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

Ministry of the Environment
Ontario

PAC #19

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee

DATE: June 9, 1980

PROJECT TITLE: The behavioural toxicology of sublethal doses of aquatic pesticides as revealed by the modification of rheotropism in rainbow trout, Salmo Gairdneri.

KEY WORDS: Aquatic herbicides - sublethal doses - rainbow trout

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. C.I. Mayfield, University of Waterloo
Dr. J.J. Dodson, " " "

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 examine a number of pesticides used in, or likely to enter, aquatic ecosystems to determine the effects on the rheotropic response of rainbow trout.

2. To determine the toxicity of these materials in terms of an LC_{50} for each, determined over a 96-h exposure time. It has become apparent that this data is necessary in many cases, so it is proposed that it be carried out for all materials.

DESCRIPTION:

Herbicides to be examined in this study include Roundup*, Weedone*, Diphenoprop*, Tordon 101*, Dyclear* and 2,4-D/2,4,5-T. 1:1 and 2:1 mixture.

* Trade name.

DURATION OF PROJECT 4 *YEARS*
PRESENT YEAR IS 4th *YEAR*
REPORTING DATE Progress Report December 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$37,400	$10,500		

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

PAC #20

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee ***DATE:*** June 9, 1980

PROJECT TITLE:
Investigation of new pests in pest management.

KEY WORDS:
Integrated pest management - new pests

PRINCIPLE INVESTIGATOR AND AFFILIATION
The Ontario Apple Commission.
Mississauga, 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 the orchard to orchard variability of San Jose Scale, European Fruit Scale, Tentiform Leafminer and European Red Mite, and to investigate reasons for their variable populations from orchard to orchard, with an eye to determining the feasibility of an orchard to orchard monitoring system of such pests to compliment the apple pest management program as it now exists.

DESCRIPTION:

Apple pest management to date has been able to accurately determine the optimum spray timing for the major pests, such as codling moth and apple maggot, on a regional basis. In an effort to expand this program to cover the pests of a more sporadic nature, individual orchard assessment and pest control recommendations were attempted in 1979. It was found that certain pests, formerly considered to be of minor status, varied greatly from orchard to orchard in both population and resultant damage level. It became obvious that there was a need to determine what factors account for this variability and to devise an orchard monitoring system to predict their presence with an eye to preventative control measures.

DURATION OF PROJECT 1 *YEARS* ***PRESENT YEAR IS*** 1st *YEAR* ***REPORTING DATE*** Progress Report December 1980

BUDGET:

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

PAC #21

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pesticides Advisory Committee *DATE:* June 9, 1980

PROJECT TITLE: The dynamics and persistence of the herbicide aqua kleen (2,4-D) and its impact on non-target micro flora.

KEY WORDS: Aquatic herbicides - non-target microflora - impact

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. B. Coleman
York University

LIAISON OFFICER OR SUPERVISOR Ontario Pesticides Advisory Committee

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

OBJECTIVE:

To determine the dynamics and persistence of the herbicide aqua kleen (2,4-D) and its impact on non-target micro flora.

DESCRIPTION:

Aqua Kleen is an aquatic formula of the herbicide 2,4-D.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress Report December 1980

BUDGET:

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

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

PC-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* June 24/80

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 alternate 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*
		$26,000		0.8

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

IS A REPORT ANTICIPATED? Yes; in-house documents available to municipalities as each investigation is completed.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PC-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* June 24/80

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 — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *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 finsihed water quality. This is essentially an on-going project which monitors asbestos levels.

DURATION OF PROJECT —— *YEARS* *PRESENT YEAR IS* 7th —— *YEAR* *REPORTING DATE* fall 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$97,000.	$20,000.	3.0	0.8

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:
Man years includes Regional MOE personnel.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: June 24, 1980

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*
		$13,000.		0.3

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-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* June 24/80

PROJECT TITLE:
Trace Contaminants in Water Treatment Plant Chemicals

KEY WORDS: Trace contaminants, chemicals

PRINCIPLE INVESTIGATOR AND AFFILIATION D. E. 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 2.5 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* late 1980

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$ 50,000.	$22,500.	2.5	0.8

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-5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: June 24/80

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 (sometimes following foam-swab cleaning) of distribution mains; isolation; identification and enumeration of animal species.

DURATION OF PROJECT 3.5 *YEARS* — *PRESENT YEAR IS* 3rd *YEAR* — *REPORTING DATE* late 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$45,500.	$19,500.	2.0	0.7

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-6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* June 24/80

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* 4 ——— *YEAR* *REPORTING DATE* fall 1980

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		$29,900.		0.8

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: Essentially an on-going project following the burgeoning analytical determinations of trace contaminants in water.

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* June 24/80

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 0.75 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Pre-pub. mid 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$31,200.	$8,000.	0.75	0.4

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-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: June 24/80

PROJECT TITLE:

Distribution System Survey

KEY WORDS: Potable water, 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* Pre-pub. mid 1980

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$73,000.	$7,800.	3	0.2

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 fall 1980.

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* June 24/80

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 and 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 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$48,000.	-	0.3	0.10

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

PC-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: June 24/80

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 subjected to Ames' testing to examine relative mutagenicity.

DURATION OF PROJECT 3 *YEARS* — *PRESENT YEAR IS* 2nd *YEAR* — *REPORTING DATE* mid 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$209,000.	$130,000.		0.2

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

IS A REPORT ANTICIPATED? Yes - MOE Lottery report; interim quarterly reports will be available

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Provincial Lottery project 79-027-13

Ministry of the Environment
Ontario

PC-11

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: June 24/80

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:* 2nd *YEAR* — *REPORTING DATE:* 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$260,684.00	$104,000.00		0.15

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Provincial Lottery Project 79-028-13
Man years are MOE input, $ for MOE Personnel not shown

Ministry of the Environment
Ontario

PC-12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: June 24, 1980

PROJECT TITLE: Manganese Removal from Surface Water

KEY WORDS: Drinking water, manganese

PRINCIPLE INVESTIGATOR AND AFFILIATION: G. Martin

LIAISON OFFICER OR SUPERVISOR: A. Oda

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

OBJECTIVE:

To study various coagulation/filtration techniques for effectiveness in removing manganese from surface waters.

DESCRIPTION:

Pilot plants including upflow clarifier and filters will be set up to investigate manganese removal by the high lime/ferric chloride process. Proprietary filters such as Durcon electromedia, manganese greensand will also be investigated.

Raw water conditions involving high colour and taste and odour are encountered.

DURATION OF PROJECT: 2 *YEARS*

PRESENT YEAR IS: 2 *YEAR*

REPORTING DATE: fall 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$8,000	$2,000	0.75	0.3

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-13

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* June 24, 1980

PROJECT TITLE:
Asbestos Cement (A/C) Pipe Corrosion

KEY WORDS: Drinking water, asbestos, corrosion

PRINCIPLE INVESTIGATOR AND AFFILIATION R. Hunsinger

LIAISON OFFICER OR SUPERVISOR K. Roberts

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

OBJECTIVE:
To investigate, through surveys, the magnitude of asbestos concentrations in distribution systems utilizing A/C pipe in aggressive water situations.

DESCRIPTION:
Samples will be taken from municipalities identified as having A/C pipe and aggressive treated water. The A/C pipe manufacturers recommend a modified Langelier Index be the criteria to determine where A/C pipe be used/not used.

Where necessary treatment suggestions (soda ash addition, lime etc.) will be made to allevaite the aggressive condition and to avoid possible problems of asbestos pick-up in the distribution system.

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

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 —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PC-14

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: June 24/80

PROJECT TITLE:
Direct Filtration - L. Muskoka

KEY WORDS: Drinking water, filtration

PRINCIPLE INVESTIGATOR AND AFFILIATION A. Oda - 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 study the direct filtration process as it applies to L. Muskoka raw water.

DESCRIPTION:

Samples in 100 gallon batches taken from L. Muskoka (winter, spring and summer conditions) and treated under the direct filtration process mode.

Different primary coagulants and coagulant/filter aids will be investigated for efficiency in producing a high quality treated water under the prevailing temperature conditions.

DURATION OF PROJECT 0.75 *YEARS* — *PRESENT YEAR IS* 1 *YEAR* — *REPORTING DATE* fall 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$15,000	$10,000	0.75	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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control, Applied Sciences Section *DATE:* July/80

PROJECT TITLE:

WATERMAIN FROST PROTECTION

KEY WORDS: Frost depth prediction, pipe load due to frost, P.V.C. pipe strain relaxation, 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 15 km 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 42 m long was imbedded about 2 m 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* 4th *YEAR* *REPORTING DATE* ——

BUDGET:

	TOTAL DOLLARS		MAN YEAR TOTAL DOLLAR COST	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	110,000	30,000	100,000	30,000

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

PC-16

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control, Applied Sciences Section *DATE:* July/80

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* 3rd *YEAR* *REPORTING DATE* ——

BUDGET:

	TOTAL DOLLARS		MAN YEAR TOTAL DOLLAR COST	
	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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control, Applied Sciences Section DATE: July/80

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: 3rd YEAR — REPORTING DATE: —

BUDGET:

TOTAL DOLLARS		MAN YEAR TOTAL DOLLAR COST	
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:* July/80

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	*PRESENT YEAR IS*	*REPORTING DATE*
4 *YEARS*	4th *YEAR*	

BUDGET:	*TOTAL DOLLARS*		*MAN YEAR TOTAL DOLLAR COST*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	160,000	20,000	150,000	20,000

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

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:* July/80

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. B. 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* 4th *YEAR* *REPORTING DATE* Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEAR TOTAL DOLLAR COST	
	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-20

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control, Applied Sciences Section *DATE:* July/80

PROJECT TITLE: UNDERGROUND MOVEMENT OF CONTAMINANTS FROM A SUBSURFACE WASTEWATER 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 surface waste water disposal systems.

To determine the effect of the type of waste water treatment 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 — 5 — *YEARS* *PRESENT YEAR IS* — 5th — *YEAR* *REPORTING DATE* ———

BUDGET:

	TOTAL DOLLARS		MAN YEAR TOTAL DOLLAR COST	
	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

RESEARCH AND DEVELOPMENT INVENTORY

PC-21

BRANCH: Pollution Control

DATE: July/80

PROJECT TITLE:

TEMAGAMI LOW PRESSURE SEWER SYSTEM

KEY WORDS: Low temperature, bedrock, sewer, Low-pressure, Temagami, shallow-buried

PRINCIPLE INVESTIGATOR AND AFFILIATION: James F. MacLaren Limited, Consulting Engineers

LIAISON OFFICER OR SUPERVISOR: M. B. Fielding

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

OBJECTIVE:

Assess the engineering design criteria, operation, performance reliability and maintenance requirements of the system. Evaluate its operating, maintenance and capital costs.

DESCRIPTION:

The low-pressure sewer system to be monitored in Temagami, where temperature drops to -30°C, topography is irregular, bedrock is at or near the surface and ground water is high, consists mainly of :

1) 8.3 km of insulated, heat traced polyethylene pipe

2) 240 kPa grinder pumps installed in 150 residences

3) 3 hectare stabilization pond

DURATION OF PROJECT: 2 1/2 YEARS PRESENT YEAR IS 1st YEAR REPORTING DATE April 82

BUDGET:

TOTAL DOLLARS	
TOTAL PROJECT	CURRENT YEAR
52,700	31,341 (to May 1980)

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

IS A REPORT ANTICIPATED? April 82

PARTICIPATION BY OTHER MINISTRIES:

Central Mortgage and Housing Corporation

REMARKS:

Ministry of the Environment

Ontario

PC-22

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control, Water Resources *DATE:* July, 1980.

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 G. Zukovs and D. G. Weatherbe

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* —— *UNSOLICITED CONTRACT* X *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *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 characterize 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 the 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 from experience gained in a well controlled field study.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 2 *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

PC-23

BRANCH: Pollution Control

DATE: July, 1980.

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: G. Zukovs, 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 25 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. Monitoring will extend over three months which include approximately 2½ months of intensive field work.

DURATION OF PROJECT: 1 YEARS

PRESENT YEAR IS: 1 YEAR

REPORTING DATE: ~~December, 1980~~

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$1,500		3/4	

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

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

RESEARCH AND DEVELOPMENT INVENTORY

PC-24

BRANCH: Pollution Control

DATE: July, 1980

PROJECT TITLE: Evaluation of Combined Sewer Detention Tank in the Borough of York.

KEY WORDS: Combined sewer overflow, detention tank.

PRINCIPLE INVESTIGATOR AND AFFILIATION

LIAISON OFFICER OR SUPERVISOR: G. Zukovs, MOE

RESEARCH CATEGORY:

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

OBJECTIVE:

To assess the effectiveness of a detention tank in the control of the quantity and quality of combined sewer overflows.

DESCRIPTION:

The project monitored tank influent and effluent over two rainfall seasons in order to assess tank pollution control effectiveness. Additional in-sewer monitoring was employed to determine average dry and wet weather flow quantity and quality for the 2,000 acre catchment area.

DURATION OF PROJECT: — 3 — YEARS

PRESENT YEAR IS — 3 — YEAR

REPORTING DATE: December, 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
			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: Study conducted in co-operation with the Borough of York.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

PC-25

BRANCH: Pollution Control

DATE: July 1980

PROJECT TITLE:

UV Disinfection Of Tertiary Effluent.

KEY WORDS:

UV Disinfection Of Tertiary Effluent.

PRINCIPLE INVESTIGATOR AND AFFILIATION

K. W. A. Ho, Ontario Ministry of Environment

LIAISON OFFICER OR SUPERVISOR

G. Zukovs

RESEARCH CATEGORY:

INTERNAL GRANT X

UNSOLICITED CONTRACT — SOLICITED CONTRACT —

MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:

To investigate the effectiveness of UV irradiation for the disinfection of a typical tertiary effluent in an Ontario WPCP's.

DESCRIPTION:

The project monitored the performance of pilot scale, proprietary, UV disinfection equipment in the Newmarket, Ontario WPCP. The effects of UV dosages and effluent physical-chemical quality on disinfection efficiency were investigated and reported.

DURATION OF PROJECT: 1 YEARS

PRESENT YEAR IS: 2 YEAR

REPORTING DATE: Sept. 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$1,500		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: Support for the project was given by the Region of York in supplying the WPCP facilities, and by Water Refining Inc. who loaned the equipment.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* July 1980

PROJECT TITLE:

Nitrification and Denitrification of Sewage Treatment Plant Effluent

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

PRINCIPLE INVESTIGATOR AND AFFILIATION K. W. A. Ho

LIAISON OFFICER OR SUPERVISOR R. Khettry

RESEARCH CATEGORY:
INTERNAL X *UNSOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* ——
GRANT —— *SOLICITED CONTRACT* —— *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 5 *YEARS* *PRESENT YEAR IS* 5 *YEAR* *REPORTING DATE* Dec. 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$20,000.00	$2,000.00	1.25	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: No

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* July 1980

PROJECT TITLE:
Phosphorus Removal from Secondary Effluents.

KEY WORDS: Phosphorus, Secondary Effluent, Chemical Precipitation, Activated Sludge Plant.

PRINCIPLE INVESTIGATOR AND AFFILIATION W. Lewandowski

LIAISON OFFICER OR SUPERVISOR R. K. Khettry

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

OBJECTIVE:
To establish the most economical physical and chemical parameters i.e. secondary clarifier sizing, chemical dosage, etc., for phosphorus removal to $\leq$ 0.5 mg/L T.P. by chemical precipitation with Iron or Aluminum salts in secondary activated sludge systems.

DESCRIPTION:
The study will be carried out at full-scale at the Brampton OEF. The removal efficiencies for BOD_5, S.S., T.P. and N. at varying F/M ratios and up to a maximum secondary clarifier upflow rate of 800 gpd/ft^2. The chemical (Fe, Al) requirements for total effluent Phosphorus concentration of $\leq$ 0.5 mg/L and for the varying upflow rates will be established. This will enable the corresponding molar ratios (Al:P, Fe:P) and the most economical combination of chemical dosage and clarifier size for $\leq$ 0.5 mg/L T.P. to be determined.

DURATION OF PROJECT 1 *YEAR* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* spring 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$15,000.00	$15,000.00	0.5	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:
No

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL

DATE: JULY 1980

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: R. K. Khettry

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

OBJECTIVE:

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

DESCRIPTION:

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

DURATION OF PROJECT: 4 YEARS
PRESENT YEAR IS: 4 YEAR
REPORTING DATE: Dec. 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$3,000.00	$250.00	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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* July 1980

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 3 YEARS *PRESENT YEAR IS* 3 YEAR *REPORTING DATE* Dec. 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$10,000.00	$1,000.00	0.5	0.1

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment

Ontario

PC-30

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: July 1980

PROJECT TITLE:

Disinfection of Lagoon Effluents prior to spraying.

KEY WORDS: Bacteriological, chlorination, Lagoon Effluent, Spraying.

PRINCIPLE INVESTIGATOR AND AFFILIATION K. W. A. Ho

LIAISON OFFICER OR SUPERVISOR R. K. Khettry

RESEARCH CATEGORY:

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

OBJECTIVE:

To define the bacteriological quality, the chlorine demand, and optimum chlorine dosage/residual required (if necessary) to disinfect lagoon effluents to an acceptable standard prior to spraying.

DESCRIPTION:

The current bacteriological quality of 6-8 institutional (golf-course, hospital, etc.,) lagoons will be established. Subsequently the lagoons will be sampled for chlorine demand and disinfection efficiency tests. Operational data of the plants will be investigated so that references to the degree of treatment of the effluents may be made.

DURATION OF PROJECT 0.25 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* Dec. 1980

BUDGET:

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

SOURCE OF FUNDS:

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

No

REMARKS:

Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

PC-31

BRANCH: Pollution Control

DATE: July, 1980

PROJECT TITLE:

Chlorine Optimization

KEY WORDS: Effective Chlorine Disinfection, Secondary Effluent.

PRINCIPLE INVESTIGATOR AND AFFILIATION: K. W. A. Ho, Ontario Ministry of Environment

LIAISON OFFICER OR SUPERVISOR: G. Zukovs, Ontario Ministry of Environment

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

OBJECTIVE:

To reduce chlorine dosage/residual and contact time required to inactivate effluent total coliform counts to 2,000/100 ml, by means of applying simple modifications to existing chlorination equipment.

DESCRIPTION:

The feasibility of improving chlorine disinfection efficiency by means of

(1) Direct application of gaseous chlorine to the bulk-effluent;

(2) Improve initial mixing scheme.

(3) Improve flow characteristics of chlorine contact chamber.

The study was conducted on pilot scale in Brampton Experimental Facility.

DURATION OF PROJECT: 3 YEARS

PRESENT YEAR IS: 3 YEAR

REPORTING DATE: March, 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
			1.5	

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Canada/Ontario Agreement Project.

Ministry of the Environment
Ontario

PC-32

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: July, 1980

PROJECT TITLE: Fate of Trace Organics in a Wastewater Treatment Plant.

KEY WORDS: Toxic Organics, Wastewater Treatment.

PRINCIPLE INVESTIGATOR AND AFFILIATION: Canviro Consultants Limited, Dr. E. E. Shannon

LIAISON OFFICER OR SUPERVISOR: G. Zukovs, MOE; Trevor Bridle, DOE

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

OBJECTIVE: Determine the fate of specific organic contaminants in passage through the unit processes of a typical secondary treatment plant.

DESCRIPTION:

Phase 1: A preliminary industrial review in conjunction with full scale WPCP sampling to identify nature and occurrance of specific organics in wastewater and sludges at the selected treatment plant.

Phase 2: A detailed investigation of the fate of the organics identified in Phase 1 in benchscale aerobic and anaerobic reactors.

DURATION OF PROJECT: 1.5 YEARS

PRESENT YEAR IS: 2 YEAR

REPORTING DATE: Sept. 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$30K		½	

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

Environment Canada

REMARKS:

Jointly funded project with equal sharing of costs.

Ministry of the Environment
Ontario

PC-33

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: July 1980

PROJECT TITLE: Chloro-Organics Formation During Disinfection Of Secondary Effluent.

KEY WORDS: Chloro-Organics, Wastewater Effluent.

PRINCIPLE INVESTIGATOR AND AFFILIATION: H. Kronis, MOE.

LIAISON OFFICER OR SUPERVISOR: G. Zukovs, MOE.

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

OBJECTIVE: To examine the formation of chlorinated organic contaminants during the disinfection of secondary effluent.

DESCRIPTION:

Formation of chloro-organics will be studied by producing chlorine concentrate solutions (injector water) from secondary effluent having nominal chlorine concentrations in the range from 100 to 3000 mg/l. Following selected contact times of 2 to 5 minutes the concentrate will be dispersed and allowed to contact secondary effluent in a bench scale chlorine contact chamber. All streams will be subsequently analyzed by GC/MS for chloro-organics.

DURATION OF PROJECT: 1 YEARS — PRESENT YEAR IS: 1 YEAR — REPORTING DATE: ~~Sept. 1981~~

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$5K		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: NORTHEASTERN REGION *DATE:* April 1980

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

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

PRINCIPLE INVESTIGATOR AND AFFILIATION: Geocon (1975) Ltd.

LIAISON OFFICER OR SUPERVISOR: L. W. Fitz

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

OBJECTIVE:

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

DESCRIPTION:

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

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

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

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* – 3rd *YEAR* *REPORTING DATE* 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	* $289,600	$32,300	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. Geocon (1975) Ltd.

PARTICIPATION BY OTHER MINISTRIES:

None

REMARKS:

Provincial Lottery - Project 77-009-11

Year 1 and 2 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 1 and 2.

Ministry of the Environment

Ontario

PL-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* April 1980

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 X	*UNSOLICITED CONTRACT* —	*MULTI-YEAR PROJECT* X	
	SOLICITED CONTRACT —	*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* 3rd *YEAR* *REPORTING DATE* 1981

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$370,000	$139,500	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:

REMARKS:

Provincial Lottery - Project 78-010-33

Ministry of the Environment

Ontario

PL-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* April 1980

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* X — *UNSOLICITED CONTRACT* — — *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* 3rd — *YEAR* *REPORTING DATE* — — — 1981 —

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$358,100	$128,700	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, 73, 90, 98 (Volumes I - VII).

Ministry of the Environment
Ontario

PL-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* April 1980

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* 3rd *YEAR* *REPORTING DATE* —— 1981

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$105,100	$35,000	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

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.

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* April 1980

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 R. B. Caton

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* 3rd *YEAR* *REPORTING DATE* —— 1981 ——

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$298,700	$77,800	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 78-014-13

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources, POLLUTION CONTROL *DATE:* April 1980

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* 2nd *- 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	$152,300	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-7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES

DATE: April 1980

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* 3rd *- YEAR* *REPORTING DATE* 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$380,900	$9,980	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-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT *DATE:* April 1980

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 lescribing 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* 2nd *YEAR* *REPORTING DATE* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$287,500	$187,500		

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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WATER RESOURCES *DATE:* April 1980

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* 2nd *YEAR* — *REPORTING DATE* 1981

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$183,787	$76,760	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

PL- 10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* April 1980

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: 2 YEARS *PRESENT YEAR IS:* 2nd YEAR *REPORTING DATE:* 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$18,100	$5,700	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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT *DATE:* April 1980

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* 2nd *YEAR* *REPORTING DATE* 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$107,423	M. of L.	None from MOE	

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* — *SPECIAL MINISTRY FUNDING* — *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-12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* April 1980

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* 2nd *YEAR* *REPORTING DATE* 1982

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$214,680	$129,700	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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL

DATE: April 1980

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:* 2nd *YEAR* *REPORTING DATE:* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$260,684	$119,700	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-14

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WATER RESOURCES *DATE:* April 1980

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*	2nd	*YEAR*	1981

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$214,427	$108,200	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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL, WATER RESOURCES *DATE:* April 1980

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 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 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$100,000	$30,000	None from M.O.E.	

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

PARTICIPATION BY OTHER MINISTRIES: No. Partners are Ottawa-Carleton, Environment Canada, etc. See Lottery Project 79-037-33.

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

PL-16

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES *DATE:* April 1980

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 — *GRANT* —
UNSOLICITED CONTRACT — *SOLICITED CONTRACT* X
MULTI-YEAR PROJECT 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 — 3 — *YEARS* *PRESENT YEAR IS* 2nd — *YEAR* *REPORTING DATE* 1981

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$200,000	$102,200	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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* April 1980

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 Ontario Research Foundation
Toronto, Ontario

LIAISON OFFICER OR SUPERVISOR R. B. Caton

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* 1981

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	$177,000	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: 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:* April 1980

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: J. Bishop, Laboratory Services Branch

RESEARCH CATEGORY: *INTERNAL GRANT* X — *UNSOLICITED CONTRACT* X — *MULTI-YEAR PROJECT* X
SOLICITED CONTRACT — *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:* 2nd *YEAR* — *REPORTING DATE:* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$99,000	$33,000	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-19

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* April 1980

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 2nd *YEAR*
REPORTING DATE 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$152,000	$53,000	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

PL-20

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL, WATER RESOURCES *DATE:* April 1980

PROJECT TITLE: Rideau River Storm Water Management Study, Ottawa, Ontario.

KEY WORDS: Urban Drainage, Stormwater Runoff, Kennedy-Burnett Pond, Rideau River Study, Flooding, Impoundment, Swimming Beaches.

PRINCIPLE INVESTIGATOR AND AFFILIATION Regional Municipality of Ottawa, Carleton

LIAISON OFFICER OR SUPERVISOR D. G. Weatherbe

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

OBJECTIVE:
The study will recommend a comprehensive stormwater management plan for the Regional Municipality of Ottawa-Carleton in the drainage area of the Rideau River. It will assist implementation of urban growth projections as incorporated in the Region's Official Plan. It will improve the present poor water quality and allow for better recreational activities on the Rideau River. Study findings may be applied to other watersheds in the Province.

DESCRIPTION:
An extensive environmental project, the Rideau River Stormwater Management Study has been proposed for Ottawa-Carleton Region. The Regional Municipality will administer the study and act as prime contractor. The City of Ottawa, the City of Nepean and Environment Canada will also contribute in collaboration with the Ministry of the Environment.

The Region of Ottawa-Carleton has undergone considerable urban development. The population of over 500,000 is mainly located in the City of Ottawa, the City of Nepean and Gloucester Township, in the watershed of the Rideau River. The official plan for the Region has intentions for a further population increase, of which 100,000 would be adjacent to the river in the South Urban Community.

However, the watershed has already suffered serious environmental damage, through pollution of the river and tributary creeks. Certain bathing area have been closed for some time because of health hazards from bacterial pollution, particularly following rainstorms.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* 1983

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$1,434,000	$253,000 from Lottery Funds		

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. Partners are Regional Municipality of Ottawa-Carleton, Environment Canada, City of Ottawa, City of Nepean.

REMARKS:

Provincial Lottery Project 79-037-33
See Provincial Lottery Project 79-030-33,

Ministry of the Environment
Ontario

PL-21

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES *DATE:* April 1, 1980

PROJECT TITLE: The Measurement of Total Organic Chlorine in Industrial Wastes.

KEY WORDS: TOX_2 Total Organic Chlorine, Industrial Wastes, Chlorine Analyses

PRINCIPLE INVESTIGATOR AND AFFILIATION: A. Benedek, Department of Chemical Engineering, McMaster University, Hamilton, Ontario

LIAISON OFFICER OR SUPERVISOR:

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

OBJECTIVE:

1. To find suitable methods for the measurement of Total Organic Chlorine in the different types of environmentally important samples.

2. To determine the capability of the proposed Total Organic Chlorine Method for the rapid measurement of specific organic groups.

3. To determine the level of Total Organic Chlorine in different types of environmental samples

DESCRIPTION:

The carbon adsorption method for Total Organic Chlorine Analysis involves a relatively large number of manipulations, and is, therefore, man-power intensive. Thus, two other methods should be examined. First, samples containing higher concentrations of halogenated organics may be oxidized without preconcentration, and then analyzed directly in a microcoulometer. Second, direct heating of a sample in the presence of copper oxide in the carbon rod furnace of an associated atomic absorption spectrophotometer may also lead to acceptable halogenated organics measurement.

The project is expected to last a total of two years. Two months will be required for an initial literature search. "Interference" and Specific Compound Recovery" studies will proceed in parallel on the two systems and these phases of the project are expected to take eight months. The "Contacting" or "Field Sampling" phase is expected to last an additional eight months.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$78,779	$39,662		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* No — *OTHER* X Provincial Lottery

IS A REPORT ANTICIPATED? Yes.

PARTICIPATION BY OTHER MINISTRIES: None.

REMARKS:

Provincial Lottery Project 79-039-32
Project started April 1, 1980.

Ministry of the Environment
Ontario

PL-22

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* April 1980

PROJECT TITLE: Effects of Ambient Air Pollution (Assessed by Personal Indoor and Outdoor Monitoring) on Humans

KEY WORDS: Air Pollution, Personal Air Monitors, Effects of Air Pollution on Humans

PRINCIPLE INVESTIGATOR AND AFFILIATION: Gage Research Institute, University of Toronto
223 College Street, Toronto, Ontario. Frances Silverman

LIAISON OFFICER OR SUPERVISOR: R. B. Caton

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

OBJECTIVE:

Calibration and validation of personal air pollution monitors for particulates SO_2 and NO_2.

To adapt these monitors to be used for comparison of indoor and outdoor pollutant levels.

To use these monitors in the field to assess effects of air pollution, using a diary, respiratory rate monitors and simple pulmonary function tests, on a well-documented group of asthmatics and healthy non-asthmatics.

DESCRIPTION:

For most accurate quantitation of personal air pollution exposure, a compact personal air pollution monitor would be used which is carried by the subject. Development of slightly modified monitors which can be left indoors and outdoors would allow some assessment of the inter-relationships between indoor, outdoor and personal air pollution exposure levels. Information to be collected during the project includes air quality measurements from fixed monitoring sites, meteorological data from each city studied, emission estimates, land use information and demographic data. In each Collaborating Centre, particulates and one of sulphur dioxide, carbon monoxide, ozone and nitrogen oxides will be evaluated, with special attention directed to the questions of indoor/outdoor variability in concentrations (and fluxes) and personal monitoring assessments.
The duration of this Project was October 1, 1979 to March 31, 1980.

DURATION OF PROJECT 1/2 *YEAR* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Yes

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$37,827	$37,827		None from MOE

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

IS A REPORT ANTICIPATED? April 1980

PARTICIPATION BY OTHER MINISTRIES:

None. Joint funding from Health and Welfare Canada

REMARKS:

This project although funded only in FY 79/80, was not included in the FY 79/80 Inventory as it was funded in FY 79/80 after the publication of the Inventory. The project is accordingly published in the FY 80/81 Inventory.

Provincial Lottery Project 79-040-31.

Ministry of the Environment
Ontario

PL-23

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WATER RESOURCES *DATE:* April 1980

PROJECT TITLE:

Bruce Hydro Electric Thermal Plume Definition Flights

KEY WORDS: Thermal Plume, Definition Flights, Aerial Survey, Bruce Hydro Plant

PRINCIPLE INVESTIGATOR AND AFFILIATION: Fred R. Brumbaugh, Intertech Remote Sensing Ltd. 2841 Riverside Drive, Ottawa, Ontario, Ontario K1V 8N4

LIAISON OFFICER OR SUPERVISOR: D. I. Ross

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

This current proposal attempts to provide a contiguous thermal definition of the total plume at the Bruce Hydro Plant as viewed against the ambient Lake Huron temperature on three occasions early in 1980. As the shape and extent of the plume can be determined at the time of the overflights, it is at present possible to define the rough mission parameters. For each of the three flights high altitude passes will be performed to image the entire plume. The proposed flight altitude is 14,000' above ground level. The width of the imaged swath at that altitude is 3.41 nautical miles. The length of all flight lines will be sufficient to ensure that ambient lake temperatures are reached. The purpose of the high altitude pass is to provide a synoptic view of the plume. In addition, to the high altitude flight, Intertech will conduct a series of low altitude flights radially outward from the hot water discharge to ambient lake temperatures. The proposed flight altitude for the low level flights is 3,000' above ground level. At this altitude the width of the imaged swath is 4,789' or 0.79 nautical miles. The purpose of the low altitude lines is to give maximum thermal detail.

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

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$14,500	$14,500	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:

REMARKS:

Provincial Lottery Project 79-041-31.

Ministry of the Environment
Ontario

PL-24

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* April 1, 1980

PROJECT TITLE: Development of Non-Chemical Approaches to Pest Control (Sterile Male Onion Maggot Technique).

KEY WORDS: Non-Chemical Pesticides, Sterile Male Onion Maggot, Onion Control, Biological Control, Pest Control

PRINCIPLE INVESTIGATOR AND AFFILIATION: F. L. McEwen, University of Guelph, Guelph, Ontario.

LIAISON OFFICER OR SUPERVISOR:

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

OBJECTIVE:

To construct a facility for mass rearing and quarantine of insects used for biological control and for mass rearing of insects for sterile male release in integrated pest management programs. To conduct a field experiment in which sterile onion maggots are released in sufficient quantity to compete with wild flies in the field and prevent their reproduction. The Keswick Marsh (about 300 acres of onions) will be used as the test site. The nature of the trial is such that it will require one year after the building is completed before 100,000,000 flies will be produced and available for release. It will then be necessary to have two years of field programs of release.

DESCRIPTION:

Recognizing the inadequacy of chemicals to control our pest prohlems, many researchers have studied alternatives and it is now clear that a pest management approach embodying the integration of chemicals and biological controls is a sound tactic.

Led by studies in the United States, the culture and release of sterilized insects has achieved outstanding success with the screwworm and certain tropical fruit flies and in Holland and Ontario, this method appears feasible for onion maggot and possibly carrot rust fly and carrot weevil.

To develop a center of expertise in non-chemical approaches to pest control and to integrate these approaches into effective pest management programs. At the end of the grant period, the University accepts responsibility for the maintenance and operation of the facility as an integral part of its ongoing research program.

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*
	$237,500	$112,500		

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: Ministry of Agriculture and Food and Agriculture Canada.

REMARKS:

Provincial Lottery Project 79-042-33.

Ministry of the Environment
Ontario

PL-25

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: NORTHEASTERN REGION

DATE: April 1980

PROJECT TITLE: Phase 11 of an Environmental Assessment Study on Uranium and Other Elements in Lichens and Mosses from Elliot Lake, Ontario.

KEY WORDS: Elliot Lake, Uranium, Lichens, Mosses, Environmental Assessment

PRINCIPLE INVESTIGATOR AND AFFILIATION: Evert Nieboer and E. K. Winterhalder, Laurentian University, Sudbury, Ontario.

LIAISON OFFICER OR SUPERVISOR: D. Balsillie, Sudbury, Ontario.

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

OBJECTIVE:

1. To analyze more thoroughly the data collected in Phase 1 undertaken in FY 78/79.
2. To develop further a new electrothermal AA procedure for the analysis of uranium at the ppb level and to apply the same approach to selected lanthanides. Our current sensitivity is 20 ppb.
3. To analyze previously collected samples that were beyond the detection limit (1 µg per 30 mg of plant ash) of the XRF procedure used in Phase 1 to establish more completely, the sphere of influence of emissions at Elliot Lake operations.
4. To collect additional lichen and moss samples to complement data collected in Phase 1.
5. To carry out laboratory uranium uptake and toxicity studies with lichens.
6. To develop fluorescent and polarographic uranium analysis procedures.

DESCRIPTION: (refer to numbering of objectives above).

1. By computer analysis.
2. Electrothermal AA in organic buffers in the presence of deionizers, in tantalum boats that fit inside graphite tubes.
3. Using the extra sensitivity of the new AA procedure.
4. More samples near exhaust vents; more around tailing areas; analysis by XRF etc.
5. Will study uptake of uranium as cation, neutral complex, and anion complex, and will do studies to localize metal in plant tissue.
6. Will use existing polarographic equipment and Scintrex UA-3 analyzer.

DURATION OF PROJECT: 2 *YEARS* — *PRESENT YEAR IS:* 1st *YEAR* — *REPORTING DATE:* March 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$89,657	$42,567	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 79-043-32.

Ministry of the Environment
Ontario

PL-26

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WATER RESOURCES *DATE:* April 1980

PROJECT TITLE: Attenuation in Ground Water of Inorganic Contaminants from Sanitary Landfills on Sandy Unconfined Aquifers.

KEY WORDS: Leachates, Sandy Aquifers, Sanitary Landfills, Attenuation of Leachate

PRINCIPLE INVESTIGATORS AND AFFILIATION J. A. Cherry, J. F. Barker, E. J. Reardon, University of Waterloo, Waterloo, Ontario.

LIAISON OFFICER OR SUPERVISOR G. Hughes, Water Resources Branch

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

OBJECTIVE: The specific objectives of the proposed research are: (i) to determine the degree of attenuation of a large number of inorganic contaminants in shallow groundwater at a selected number of landfills situated on sandy unconfined aquifers and (ii) to develop an interpretive hydrogeological and hydrogeochemical framework to account for the observed patterns of contaminant attenuation. The ultimate aim of this research is to provide for an improved methodology for predicting the degree of attenuation that will occur at sandy sites at which new landfills may be proposed for development.

DESCRIPTION: A preliminary version of a hydrogeochemical and hydrodynamic framework to account for the attenuation of inorganic landfill-derived contaminants in sandy deposits was developed during a three-year investigation of an abandoned landfill at CFB Borden, Ontario. In this new research project, we intend to develop a more comprehensive methodology for attenuation prediction and to test the methodology by application to two sites that are much different than the Borden site. These sites are the major landfill that serves the city of North Bay and the Woolwich landfill, which serves the northern part of the Region of Waterloo. A detailed network of multi-level groundwater monitoring devices will be installed at each site and soil samples will be analysed for parameters used in attenuation prediction. Detailed maps of contaminant concentrations in the ground water zone will be produced for comparison to predicted distributions.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* March 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$116,000	$48.500	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:

REMARKS:

Provincial Lottery Project 79-044-33.

Ministry of the Environment
Ontario

WM-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT *DATE:* May 1980

PROJECT TITLE:

Remote Sensing Study

KEY WORDS: Sanitary Landfill, Aerial Photographic Techniques, Infra Red Thermal Imagery, Waste Disposal Sites.

PRINCIPLE INVESTIGATOR AND AFFILIATION M. M. Dillon Ltd.

LIAISON OFFICER OR SUPERVISOR L. Ficzere

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

OBJECTIVE:

To evaluate the use of aerial photographic techniques, infra red and thermal imagery in locating waste disposal sites.

DESCRIPTION:

The study is designed to implement the results of previous research and to fully investigate the potential of remote sensing techniques as it applies specifically to the Ministry of the Environment and its programs of waste management.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* February 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	88,100	84,200		0.6

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

IS A REPORT ANTICIPATED? Yes.

PARTICIPATION BY OTHER MINISTRIES:

No.

REMARKS:

Ministry of the Environment
Ontario

WM-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT *DATE:* May 1980

PROJECT TITLE:

St. Thomas Greenhouse Heating Project

KEY WORDS: Methane Gas, Migration, Fuel, Landfill, Energy, Greenhouse heating, Methane Pumping

PRINCIPLE INVESTIGATOR AND AFFILIATION Tony Crutcher
Conestoga Rovers & Associates, Waterloo

LIAISON OFFICER OR SUPERVISOR J. Petoia

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

OBJECTIVE:

To obtain longterm pumping rate data using methane gas to heat a greenhouse.

DESCRIPTION:

Landfill generated methane will be used to heat a constructed greenhouse for period January 4, 1980 - January 4, 1981. Project operated for a one year period successfully in 1979-80. New study will continue operation with larger pump to increase pumping rate. Will establish new cone of influence (methane distribution - % concentration) in the landfilled area.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	38,105.00	38,105.00	0.2	0.2

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

IS A REPORT ANTICIPATED?

Yes.

PARTICIPATION BY OTHER MINISTRIES:

E.P.S. (Federal) Environment Canada

REMARKS:

Ministry of the Environment
Ontario

WM-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT *DATE:* May 1980

PROJECT TITLE:
Gas Migration Study

KEY WORDS: Garbage Site, Landfill Site, Gas Production, Methane, Migration of Garbage Gas, Explosion Hazard

PRINCIPLE INVESTIGATOR AND AFFILIATION John Menan, Hydrology Consultants Ltd., Mississauga, Ontario

LIAISON OFFICER OR SUPERVISOR J. Petoia

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

OBJECTIVE:

To obtain information on gas production and migration in the Ontario Landfill Sites in order to make sound decisions regarding the use of lands adjacent to or on landfilled areas.

DESCRIPTION:

Study will look into production and migration of gas at several sites in Ontario. Sites have been selected to obtain data from climatic influences, type of waste, soil conditions, structures, etc. Different monitoring and sampling techniques will be examined.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* June 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$287,500.00	142,800	1	1

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:
Federal Government (Resource Capacity).

REMARKS:

Refer to page PL-8 of FY 80/81 Inventory of Research Projects.
Provincial Lottery Project 78-023-13.

Ministry of the Environment

ntario

WM-4

RESEARCH AND DEVELOPMENT INVENTORY

RANCH: Waste Managment

DATE: July 30, 1980

OJECT TITLE:

Compost Utilization Demonstration

Y WORDS: Compost, Agriculture

INCIPLE INVESTIGATOR
D AFFILIATION: Dr. C.S. Baldwin, Ridgetown College of Agricultural Technology

AISON OFFICER
SUPERVISOR: B.I. Boyko, Waste Management Branch, MOE

SEARCH TEGORY: INTERNAL ___ GRANT X UNSOLICITED CONTRACT ___ SOLICITED CONTRACT ___ MULTI-YEAR PROJECT X CONCURRENT PROJECT ___

JECTIVE:

To demonstrate whether the use of compost derived from wastewater sludge or municipal refuse is of significant benefit when applied to agricultural land.

SCRIPTION:

Three 0.5 acre plots will be treated with wastewater sludge compost at application rates of 0, 50, and 100 tons per acre. Similarly, plots of equal size will be treated with compost prepared from municipal refuse. Corn will be used as the indicator crop. In addition to monitoring crop and soil properties, samples will be taken for bacteriological examination and metal analysis.

ATION PROJECT: 2 YEARS; PRESENT YEAR IS: 1st YEAR; REPORTING DATE: December, 1981

GET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$49,000.00	$16,500.00	2.0	0.5

RCE OF DS: REGULAR WORK PROGRAM X; SPECIAL MINISTRY FUNDING ___; JOINTLY FUNDED PROJECT ___; OTHER ___

A REPORT ANTICIPATED? Yes

TICIPATION BY OTHER MINISTRIES:

Ministry of Agriculture and Food, and Metro Windsor - Essex County Health Unit

ARKS:

E 1293 6/76

Ministry of the Environment

WM-5

RESEARCH AND DEVELOPMENT INVENTORY

ARCH: Waste Management Branch

DATE: October, 1979

OJECT TITLE:

Use of Newsprint for Animal Bedding

Y WORDS: Bedding - Animal - Newsprint

INCIPLE INVESTIGATOR
D AFFILIATION: Dr. D.G. Grieves, University of Guelph

AISON OFFICER
SUPERVISOR: P.J. Provias, Municipal Waste Section, Waste Management Branch

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

JECTIVE:

To investigate the voluntary intake of shredded newsprint by dairy cattle.

SCRIPTION:

Twelve dairy cows will be used in the study of the voluntary intake of shredded newsprint. Work will be conducted by the Animal and Poultry Science Dept. under Dr. D.G. Grieve at the Elora Dairy Research Centre. Shredded newsprint will be supplied by the Grey-Bruce Recycling Co., Owen Sound. It is expected that the schedule will be: initiation phase - 2 months, data collection - 5 months, chemical and data analysis - 3 months, report writing - 2 months.

ATION PROJECT: 1 YEARS — PRESENT YEAR IS 1st YEAR — REPORTING DATE: October, 1980

GET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$14,611.00			

RCE OF DS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

A REPORT ANTICIPATED? Yes

TICIPATION BY OTHER MINISTRIES:

No

ARKS:

Project to commence January, 1980 and conclude October, 1980.

E 1293 6/76

Ministry of the Environment

Ontario

WM-6

RESEARCH AND DEVELOPMENT INVENTORY

ANCH: Waste Management

DATE: April, 1980

OJECT TITLE:

Compost as a Container Medium Amendment

Y WORDS: Compost - Horticulture

INCIPLE INVESTIGATOR D AFFILIATION G.P. Lumis, Professor, University of Guelph

AISON OFFICER SUPERVISOR P.J. Provias, Municipal Waste Section, Waste Management Branch

SEARCH TEGORY:

INTERNAL GRANT X

UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* ——

MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

JECTIVE:

To determine the most feasible compost utilization techniques to produce an acceptable growing medium.

CRIPTION:

Several deciduous and evergreen species will be grown in 6 litre pots for 2 seasons. Compost will be used to establish parameters of plant root and shoot growth.

Recommendations for usage by commercial growers will be developed.

ATION PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* March, 1981

GET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$1,500.00			

RCE OF DS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

L REPORT ANTICIPATED? Yes

TICIPATION BY OTHER MINISTRIES:

No

ARKS:

M 1293 6/76

Ministry of the Environment

Ontario

WM-7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management *DATE:* May, 1980

PROJECT TITLE:

"Organic Waste (compost) for the Modification of Turf Grass Root Zones"

KEY WORDS:

Compost - Turf Grass

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. J.L. Eggens, University of Guelph

LIAISON OFFICER OR SUPERVISOR P.J. Provias, Municipal Waste Section, Waste Management Branch

RESEARCH CATEGORY:

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

OBJECTIVE:

To determine the suitability of organic waste material (compost) provided from the Ministry's Experimental Plant for Resource Recovery as an organic soil amendment for a) high foot traffic areas, b) turf grass establishment as seed or sod in excessively drained areas such as graval pits.

DESCRIPTION:

Turf grasses will be grown in pot culture. The root zone will be prepared using peat and compost with several soils. Field research plots of 2 x 3 m. will also be prepared and the effectiveness of the compost on turf establishment will be evaluated. It is expected that local gravel pits as well as hydroseeding techniques will also be employed.

DURATION OF PROJECT 2 *YEARS* — *PRESENT YEAR IS* 1st *YEAR* — *REPORTING DATE* May, 1981 / May, 1982

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$21,244.00			

SOURCE OF FUNDS:

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

IS A REPORT ANTICIPATED?

Yes

PARTICIPATION BY OTHER MINISTRIES:

No

REMARKS:

Project to commence in May, 1980 at the Cambridge Research Station of the University of Guelph.

Ministry of the Environment

Ontario

WM-8

RESEARCH AND DEVELOPMENT INVENTORY

ANCH: Waste Management

DATE: July 30, 1980

OJECT TITLE:

Compost Bulking Material Study

Y WORDS: Composting, Sludge

INCIPLE INVESTIGATOR D AFFILIATION L.S. Romano, Director of Pollution Control, City of Windsor

AISON OFFICER SUPERVISOR B.I. Boyko, Waste Management Branch, MOE

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

JECTIVE:

To investigate the use of alternate bulking agents, i.e. shredded tires and pelletized RDF, in the aerated window composting of wastewater sludge.

SCRIPTION:

Sludge will be windowed at varying ratios of sludge, compost and bulking agent. Emphasis is on recovery of bulking agent by screening as well as degree of sludge stabilization.

ATION PROJECT 0.5 *YEARS* *PRESENT YEAR IS* —— *YEAR* *REPORTING DATE* May, 1981

GET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$16,833.00			

RCE OF DS:

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

A REPORT ANTICIPATED?

Yes

TICIPATION BY OTHER MINISTRIES:

None

ARKS:

Ministry of the Environment

WM-9

RESEARCH AND DEVELOPMENT INVENTORY

RESEARCH: Waste Management

DATE: July 30, 1980

PROJECT TITLE:
Use of Refuse Derived Fuel in Cement Kilns

KEY WORDS:
energy, refuse derived fuel (RDF), solid waste

PRINCIPLE INVESTIGATOR AND AFFILIATION
P.J. Provias, Waste Management Branch, MOE
R.M. Brannen, Canada Cement LaFarge Limited

LIAISON OFFICER SUPERVISOR
B.I. Boyko, Waste Management, 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: 4 YEARS — PRESENT YEAR IS: 4th YEAR — REPORTING DATE: June, 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$290,000.00	0	0.5	0.25

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

FINAL REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
None

REMARKS:
Initial firing of refuse derived fuel commenced in late November, 1978. Equipment malfunctions and Company production schedules limited RDF tests to May and December, 1979. A seventeen day burn at RDF substitution rates of 20 and 30 percent was conducted in April, 1980.

Ministry of the Environment
Ontario

1980/81 Projects
RESEARCH AND DEVELOPMENT INVENTORY

WR-1

BRANCH: Water Resources Branch

DATE: June 3, 1980

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 which emphasizes the lakes' nearshore areas includes 37 separate projects in 1980/81. Twenty seven projects involve field activities.

DURATION OF PROJECT ~~ongoing~~ *YEARS* — *PRESENT YEAR IS* ~~16th~~ *YEAR* — *REPORTING DATE* ~~annually~~

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		2.1 million		57

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 reports 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

1980/81 Projects
RESEARCH AND DEVELOPMENT INVENTORY

WR-2

BRANCH: Water Resources - Hydrology & Monitoring *DATE:* May 15, 1980

PROJECT TITLE:
Water Quality Flagging

KEY WORDS: Water Quality; Water quality criteria; Computer program

PRINCIPLE INVESTIGATOR AND AFFILIATION J. E. O'Neill, Networks Unit

LIAISON OFFICER OR SUPERVISOR R. D. Terry, Chief, Networks Unit

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

OBJECTIVE:
To operate a computer program that enables the examination and interpretive reporting of water quality of inland lakes and streams, and to continue to identify non-compliance problem areas.

DESCRIPTION:
With over 800 water quality stations in the Provincial network, it is difficult to provide water quality interpretations at all locations within a reasonable time. To this end, a computer program has been developed to provide the flexibility of comparing existing water quality either to provincial criteria or (in the absence of specific criteria) to user designated reference levels. The flagging procedure will report on the frequencies (i.e. percent of water quality samples) of violation of criteria for different water uses in a given period.

DURATION OF PROJECT Ongoing YEARS *PRESENT YEAR IS* 3 YEAR *REPORTING DATE* Annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	30,000	$20,000		3/4

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

IS A REPORT ANTICIPATED? Methodology report 1980, Annual reports for 1980 and on

PARTICIPATION BY OTHER MINISTRIES:
Nil

REMARKS:

Ministry of the Environment

1980/81 Projects

RESEARCH AND DEVELOPMENT INVENTORY

WR-3

BRANCH: Water Resources - Hydrology & Monitoring *DATE:* May 15, 1980

PROJECT TITLE:

Surface-Water Quality Trends in Ontario

KEY WORDS: Surface Water; Quality Hydrology; Computer Program

PRINCIPLE INVESTIGATOR AND AFFILIATION V. I. Chin

LIAISON OFFICER & SUPERVISOR U. Sibul, Head, Resource Assessment Group

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

OBJECTIVE:

To determine trends in surface-water quality at Provincial Network stations in Ontario .

DESCRIPTION:

The project involves the use of computer techniques to aggregate water quality variables (total coliform, total phosphorus, nitrate, BOD_5, dissolved oxygen, total solids, turbidity) into a single number in order to compare general changes in water quality at Provincial surface-water quality networks stations from year to year.

DURATION OF PROJECT Ongoing *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* FIRST March 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$25,000	$25,000	1	1

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

IS A REPORT ANTICIPATED?

Yes - Reports are scheduled at various phases of work

PARTICIPATION BY OTHER MINISTRIES:

Nil

REMARKS:

The project is to be evaluated for merit following first report in 1981.

Ministry of the Environment
Ontario

1980/81 Projects
RESEARCH AND DEVELOPMENT INVENTORY

WR-4

BRANCH: Water Resources - Hydrology & Monitoring *DATE:* May 15, 1980

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 & 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		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$63,000		2.5

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

IS A REPORT ANTICIPATED? Every 18 months (approx.) "Water Resources Report" series.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Existing publications are for the following drainage basins; Big Otter Creek; Big Creek; Upper Nottawasaga River; Moira River; Duffins - Rouge; three reports for Northern Ontario; South Nation ; Holland - Black (in draft); Humber-Don (in draft); field work has begun in the Credit.

Ministry of the Environment
Ontario

1980/81 Projects
RESEARCH AND DEVELOPMENT INVENTORY

WR-5

BRANCH: Water Resources - Hydrology & Monitoring *DATE:* May 15, 1980

PROJECT TITLE:
International Great Lakes Consumptive Uses

KEY WORDS:
IJC; Great Lakes Water Use; Water demand; Water Consumption

PRINCIPLE INVESTIGATOR AND AFFILIATION D. Vallery

LIAISON OFFICER & SUPERVISOR R. C. Hore, Supervisor, Hydrology & Monitoring Section

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

OBJECTIVE:
To inventory past and present water uses and to project future water demands in the Ontario portion of the International Great Lakes basin.

DESCRIPTION:
In order to formulate long-term management plans for the International Great Lakes, a joint Canada - United States study of water uses in the Great Lakes basins is being undertaken. The Ministry of the Environment contribution to this study will be to inventory past and present uses, to develop a methodology for water-demand projections, and to project water demand to the year 2035 for the Ontario portion of the Great Lakes basins.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$20,000	Balance	1	Balance

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

IS A REPORT ANTICIPATED? Final report to IJC - March 1981 .

PARTICIPATION BY OTHER MINISTRIES:
NIL

REMARKS:
Final report to be published by the International Great Lakes Diversion and Consumptive Uses Study Board.

Ministry of the Environment
Ontario

1980/81 Projects
RESEARCH AND DEVELOPMENT INVENTORY

WR-6

BRANCH: Water Resources - Hydrology & Monitoring *DATE:* May 15, 1980

PROJECT TITLE:

Ground Water Resources in the Grand River Basin

KEY WORDS: Grand River; Ground water; Aquifers; Municipal Ground-water supply

PRINCIPLE INVESTIGATOR AND AFFILIATION U. Sibul, R. Szudy

LIAISON OFFICER & 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* 2 *YEAR* *REPORTING DATE* 1980

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$150,000	$4,000	7	½

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: Report title "Ground-Water Resources in the Grand River Basin
Technical Report Series
Report # 10

Ministry of the Environment

1980/81 Projects

RESEARCH AND DEVELOPMENT INVENTORY

WR-7

BRANCH: Water Resources - Hydrology and Monitoring *DATE:* May 15, 1980

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. Rodriques, 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	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		$48,000		2

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

IS A REPORT ANTICIPATED? Reports are prepared on various projects and aspects.

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

1980/81 Projects
RESEARCH AND DEVELOPMENT INVENTORY

WR-8

BRANCH: Water Resources - Hydrology & Monitoring *DATE:* May 15, 1980

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 & SUPERVISOR As above

RESEARCH CATEGORY: *INTERNAL* X *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *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	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		$58,000		2 1/2

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

WILL 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

1980/81 Projects

RESEARCH AND DEVELOPMENT INVENTORY

WR-9

BRANCH: Water Resources - Hydrology & Monitoring *DATE:* May 15, 1980

PROJECT TITLE:

Hydrogeologic Mapping

KEY WORDS: Ground Water; Probability; Susceptibility; Hydrogeology

PRINCIPLE INVESTIGATOR AND AFFILIATION M. Turner

LIAISON OFFICER & SUPERVISOR R. C. Ostry, Head, Technical Support Group

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

OBJECTIVE:

To determine ground-water yields and the susceptibility of ground water to contamination.

DESCRIPTION:

The project involves mapping of ground-water resources and the susceptibility of these resources to contamination in the Province. The maps are intended to provide basic ground-water data and interpretations on the availability of ground water in order to assess water-supply potentials for various uses, and to determine the general susceptibility of these resources to contamination from common surface sources of pollution.

DURATION OF PROJECT On-going ——— *YEARS* *PRESENT YEAR IS* ——— *YEAR* *REPORTING DATE* 18 months

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, Norfolk and Peel. Simcoe (South Portion) will be published in 80/81. Work is progressing on Simcoe (North Portion). Work will be initiated for Grey County. Hydrogeologic Environments and the Susceptibility of Ground Water to Contamination map has been published as the first map in a series of similar maps on larger scales.

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WR-10

1980/81 Projects
RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology & Monitoring *DATE:* May 15, 1980

PROJECT TITLE:
Ground Water Quality Pilot Project

KEY WORDS: Ground-Water; Quality

PRINCIPLE INVESTIGATOR AND AFFILIATION J. Miller

LIAISON OFFICER OR SUPERVISOR U. Sibul, Head, Resource Assessment Group

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

OBJECTIVE:
To determine the variability of ground-water quality with time

DESCRIPTION:
The project involves regular sampling of a number of wells to determine changes in ground-water quality with time. The pilot project results will be used to determine sampling frequencies for a ground water network to be established for the Province. Weekly samples have been taken since April of 1979, and each has been analyzed for the major inorganic parameters.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	10,000	5,000	½	¼

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

IS A REPORT ANTICIPATED? Yes; results of pilot project

PARTICIPATION BY OTHER MINISTRIES:
Nil

REMARKS:

Ministry of the Environment
Ontario

1980/81 Projects
RESEARCH AND DEVELOPMENT INVENTORY

WR-11

BRANCH: Water Resources

DATE: June 6, 1980

PROJECT TITLE:

Nanticoke: Currents and Water Quality

KEY WORDS:

Water movement; water quality; thermal discharge

PRINCIPLE INVESTIGATOR AND AFFILIATION

I. Heathcote, B. Kohli, R. Weiler, Lake Systems Unit, Water Modelling Section

LIAISON OFFICER OR SUPERVISOR

R. Weiler

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

OBJECTIVE:

To monitor the changes in the nearshore currents and water quality caused by the discharges from the Ontario Hydro generating station, Stelco's Lake Erie Development and Texaco's refinery and other industrial and urban development in the Nanticoke area. These projects are part of the larger nearshore monitoring program of the Nanticoke Environmental Committee.

DESCRIPTION:

Operation of recording current waters and periodical sampling of water for chemical analysis is continuing. Reports summarizing the observation on water quality and currents for 1969-1978 have been released. A report integrating the findings of all of the Nanticoke Environmental Committee projects is under preparation with planned release in 1980.

DURATION OF PROJECT		*PRESENT YEAR IS*		*REPORTING DATE*
15	*YEARS*	11	*YEAR*	annually

BUDGET: included in overall Great Lakes budget

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	72,000		2

SOURCE OF FUNDS: Canada-Ontario Agreement on Great Lakes Water Quality

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

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, 1977 (M. Palmer, J. Polak), 1978 (I. Heathcote)
Currents: 1967-70 (M. Palmer, R. Walker), 1974, 1975, 1976, 1977, 1978 (B. Kohli)

Ministry of the Environment
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1980/81 Projects
RESEARCH AND DEVELOPMENT INVENTORY

WR-12

BRANCH: Water Resources Branch

DATE: June 6, 1980

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, Water Modelling Section

LIAISON OFFICER OR SUPERVISOR: R. Weiler

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

OBJECTIVE: Continued monitoring of Harbour water quality to assess compliance with IJC objectives, and determination of water quality trends. Measurement of exchange between the Harbour and Lake Ontario. Modelling of currents and dispersion of pollutants in inner Harbour.

DESCRIPTION:
Measurement of the micro-scale time variations of water quality and currents and harbour-lake exchange. Numerical modelling of water movements and water quality with special emphasis on simulation of effects of stormwater runoff.

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

BUDGET: amounts are included in overall Great Lakes Budget

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		29,000		0.2

SOURCE OF FUNDS: Canada-Ontario Agreement on Great Lakes Water Quality — *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* X — *OTHER* —

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:
Natural Resources, Toronto Harbour Commission, Metro Toronto, City of Toronto

REMARKS: Reports already released:
D. J. Poulton: water quality conditions of Toronto Harbour by recording chemistry meters 1975-76; Toronto Harbour numerical model; Application of short time scale recording meter data to numerical modelling of Toronto Harbour; Toronto Harbour Numerical model: verificati and preliminary stormwater runoff results. B. Kohli: Physical aspects of Toronto Harbour.

Ministry of the Environment
Ontario

1980/81 Projects
RESEARCH AND DEVELOPMENT INVENTORY

WR-13

BRANCH: Water Resources

DATE: June 6, 1980

PROJECT TITLE:
Hamilton Harbour Study

KEY WORDS: Water quality, sediment, sediment oxygen demand, harbour-lake exchange, physical chemical processes, modelling of oxygen depletion

PRINCIPLE INVESTIGATOR AND AFFILIATION M. Zarull, D. Poulton, B. Kohli, I. Heathcote, Lake Systems Unit, Water Modelling Section

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 in the harbour, especially oxygen depletion and exchange between the harbour and Lake Ontario. Develop models that simulate oxygen depletion. 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 and process; oxygen budget. Development of models simulating physical, chemical and biological processes on the harbour.

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

BUDGET: amounts are included in overall Great Lakes budget

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		187,000		5.2

SOURCE OF FUNDS: Canada-Ontario Agreement on Great Lakes Water Quality

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

IS A REPORT ANTICIPATED?
Yes, annually

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Hamilton Harbour Study: May 1974, 1974, 1975, 1976, 1977 (not yet released)
G. Harris et al - Biological survey of Hamilton Harbour, 1975, 1976; Physical variability and phytoplankton communities: 1975-1978; Research in Hamilton Harbour: 1978, 1979.
B. Kohli: Mass exchange between Hamilton Harbour and Lake Ontario.

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Ontario

1980/81 Projects
RESEARCH AND DEVELOPMENT INVENTORY

WR-14

BRANCH: Water Resources *DATE:* June 9, 1980

PROJECT TITLE: Grand River Basin Water Management Study

KEY WORDS: Water Quality, Modelling, Economic, Optimization, Aquatic Plant, Algae, Dissolved oxygen

PRINCIPLE INVESTIGATOR AND AFFILIATION D. Weatherbe, L. A. Logan, Water Modelling Section

LIAISON OFFICER OR SUPERVISOR D. G. Weatherbe, Head, River Systems, Water Modelling Section

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

OBJECTIVE: To develop water quality models and economic systems models to analyse water quality effects and, frame, evaluate and optimize alternative water management strategies designed to meet water quality, flood control and water supply requirements for existing and projected future conditions.

DESCRIPTION: Water Quality Models of varying levels of complexity were developed including a dynamic continuous model (GRSM) of dissolved oxygen and ammonia, which accounts for varying hydrological, waste loading and meteorological conditions. Incorporated in this model, and developed as a separate model was the Ecological Simulation Model ECOL, designed to predict the effect of nutrient loads to a river system on the aquatic plant biomass, over a growing season.

An Economic Systems model utilizing a linear programming techniques has been developed and was used to define the economics of water supply, flood control and water quality control options and to screen alternatives for further testing in more detail with the water quality models.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$550 K	$75 K	30	7

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

IS A REPORT ANTICIPATED? Grand River Technical Report Series; Final water management Report September, 1980

PARTICIPATION BY OTHER MINISTRIES:
Complimentary 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.

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