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INVENTORY OF RESEARCH PROJECTS 1981 - 82

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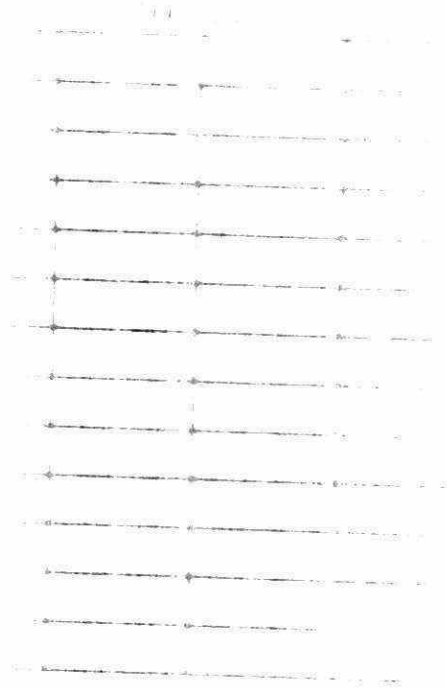
Ontario Ministry of the Environment

The Honourable
Keith C. Norton, Q.C.,
Minister

Gérard J. M. Raymond
Deputy Minister



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MINISTRY OF THE ENVIRONMENT
NOV 06 1981
HAZARDOUS CONTAMINANTS
OFFICE

F.Y. 1981/1982

INVENTORY OF RESEARCH PROJECTS

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PREFACE

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

P. D. Foley
Chairman, Research Advisory Committee
Pollution Control Branch

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 1981/82 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 81/82 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 81/82 undertaken up-to-date October 1, 1981.

FORMAT OF FY 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

Now is included in the mandate of the H.C. Co-ordinator?

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-two (22) projects are being funded in 1981/82 at a budget of $900,000. 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, FY 79/80 and FY 80/81
Projects with FY 81/82 Research Projects
According to Time Duration

	FY 77/78	FY 78/79	FY 79/80	FY 80/81	FY 81/82
Projects in their first year	58	60	69	75	91
Projects in their second year	25	36	59	56	51
Projects in their third year	23	18	23	25	29
Projects in their fourth year	9	9	19	12	5
Projects existing for five years or longer	25	18	13	12	19
Total Research Projects	140	141	183	180	195
Projects conducted within the Ministry of the Environment	85	63	102	103	101
Projects conducted by Outside Contracts at Universities and Consultants	55	78	81	77	94

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A.P.I.O.S.

(AIR POLLUTION IN ONTARIO STUDY)

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HAZARDOUS CONTAMINANTS OFFICE

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Ministry of the Environment
Ontario

AS-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Resources Division *DATE:* June 8,1981

PROJECT TITLE: Sources of pre-acidification data on Ontario lakes and streams.

KEY WORDS: acid rain,baseline data,literature survey

PRINCIPLE INVESTIGATOR AND AFFILIATION Gillian Booth - Booth Aquatic Research Group Inc.

LIAISON OFFICER OR SUPERVISOR Eva Heczko

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

OBJECTIVE:
To conduct a survey of potential sources of pre-acidification data on Ontario lakes and streams.

DESCRIPTION:
A survey will be conducted of potential sources of pre-acidification baseline data on Ontario lakes and streams.
Sources to be surveyed include:
- university thesis
- university professors
- the Leslie Frost Centre
- Conservation Authority stream survey files
- Conservation Authority Branch Reports
- selected industrial scientists (Hydro, Inco for example)
- selected federal and provincial scientists

DURATION OF PROJECT 5 months *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Oct. 1, 1981

BUDGET: 210-2204

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$2500.00	$2500.00	.4	.4

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

IS A REPORT ANTICIPATED?
yes

PARTICIPATION BY OTHER MINISTRIES:
Ministry of Natural Resources will provide $2500.00

REMARKS:

Ministry of the Environment
Ontario

AR-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1981

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: R. Pearson

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* 2nd YEAR *REPORTING DATE:* annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	24,690	13,620	2	2

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

AR-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1981

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/B. Loescher

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —
UNSOLICITED CONTRACT — *SOLICITED CONTRACT* —
MULTI-YEAR PROJECT — *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: 2 *YEAR*

REPORTING DATE: annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	21,233	10,000	2	1

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1981

PROJECT TITLE: Continuous Monitoring of PAN in the Atmosphere

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

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

LIAISON OFFICER OR SUPERVISOR: M. Lusis/P. Wong

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

OBJECTIVE:

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

DESCRIPTION:

An automated, portable, microprocessor controlled PAN analyzer has been constructed and calibrated. This analyzer will be used to determine PAN gas phase kinetics as well as PAN level in selected areas of southern Ontario.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	37,500	37,500	3	

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1981

PROJECT TITLE: Aerosol Analysis System

KEY WORDS: Aerosol, sampling, 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 build prototype aerosol collection and desorption systems matched to TAGA.

DESCRIPTION:
A modified virtual impactor system, will be coupled to a hot plasma vaporization source to enable real time elemental analysis to be performed on aerosols. An impactor geometry for organics will also be tested.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	39,465	20,000	2	1

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1981

PROJECT TITLE:
Development of a strategy for predicting the impact of fast food restaurants on the surrounding community.

KEY WORDS: Odour

PRINCIPLE INVESTIGATOR AND AFFILIATION: Professor A.W. Gnyp, University of Windsor

LIAISON OFFICER OR SUPERVISOR E.T. Barrow, O. Meresz

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

OBJECTIVE:

To develop a strategy for predicting the impact of odorous pollutants from fast food restaurants.

DESCRIPTION:

Ambient and source sampling techniques will be developed and correlated with complaint potential thresholds.

DURATION OF PROJECT 3 *YEARS*

PRESENT YEAR IS 1 *YEAR*

REPORTING DATE annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	20,000	7,100	3	1

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* July, 1981

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 D. Harper

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* 2nd *YEAR* *REPORTING DATE* annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	38,408	23,776	2	1

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1981

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: O. Meresz, A. Szakolcai

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: 2 *YEARS*

PRESENT YEAR IS: 2nd *YEAR*

REPORTING DATE: annually

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	28,000	22,000	2.5	2

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1981

PROJECT TITLE: Long and short term studies of airborne pollutants.

KEY WORDS: Aerosol, PIXE, Elemental Analysis, Trees, Historical Pollution

PRINCIPLE INVESTIGATOR AND AFFILIATION: Professor J.D. McArthur, Queens University

LIAISON OFFICER OR SUPERVISOR: R. Judge/McIlveen

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

OBJECTIVE:

To determine short (20 min.) and long (before industrial revolution) time scale variations in air pollution.

DESCRIPTION:

Proton induced x-ray emission analysis will be applied to aerosol collected on filters and to tree rings.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	42,500	10,000	2	0.6

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-9

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1981

PROJECT TITLE: Satellite Images of Aerosol Distributions over the Great Lakes

KEY WORDS: Satellite, Remote Sensing, Aerosol, Long Range Transport

PRINCIPLE INVESTIGATOR AND AFFILIATION: Professor J.R. Miller, York University

LIAISON OFFICER OR SUPERVISOR: M. Lusis

RESEARCH CATEGORY:

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

OBJECTIVE:

To derive images of aerosol movement across the Great Lakes.

DESCRIPTION:

Satellite water colour imagery will be analyzed for aerosol spatial distribution information and this will be correlated with existing airborne and ground based measurements.

DURATION OF PROJECT: 1 YEARS

PRESENT YEAR IS: 1 YEAR

REPORTING DATE: Annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	3,221	3,221	0.2	0.2

SOURCE OF FUNDS:

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1981

PROJECT TITLE:

Tomato Responses to Air Pollution in Southern Ontario

KEY WORDS: Phytotoxicology, ozone

PRINCIPLE INVESTIGATOR AND AFFILIATION Professor D. Ormrod, University of Guelph

LIAISON OFFICER OR SUPERVISOR R. Pearson

RESEARCH CATEGORY:

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

OBJECTIVE:

To determine optimum protection strategy against ozone for tomato 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 crops.

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

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	30,425	11,020	3	1

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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:*

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-PAHs 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 3 *YEAR*
REPORTING DATE annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	47,033	24,000	4	1

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

IS A REPORT ANTICIPATED?
YES

PARTICIPATION BY OTHER MINISTRIES:
NO

REMARKS:

Ministry of the Environment
Ontario

AR-12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:*

PROJECT TITLE: Provision of PAHs and Aza-PAHs as environmental analytical standards.

KEY WORDS: PAH, synthesis

PRINCIPLE INVESTIGATOR AND AFFILIATION Professor V. Snieckus, University of Waterloo

LIAISON OFFICER OR SUPERVISOR A. Szakolcai/O. Meresz

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

OBJECTIVE:

To provide PAHs and Aza PAHs as analytical standards.

DESCRIPTION:

Known carcinogenic PAHs and aza PAHs will be synthesized by short and efficient routes using previously worked out methods as well as alternates.

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

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	20,000	20,000	1½	1½

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-13

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1981

PROJECT TITLE: Acid Precipitation Estimation by Indicating Ion Exchange

KEY WORDS: Acid Precipitation

PRINCIPLE INVESTIGATOR AND AFFILIATION Professor R.A. Stairs, Trent University

LIAISON OFFICER OR SUPERVISOR W. Chan/S. Villard

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

OBJECTIVE:

To develop and test a simple inexpensive method of estimating the integrated acid precipitation over a time interval.

DESCRIPTION:

A simplified rain guage will be used to feed precipitation to an ion-exchange resin stained with indicator.

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
	18,273	9,483	3	1½

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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1981

PROJECT TITLE:

Chemoreceptor membrane as an electrochemical sensor for trace organics in the atmosphere.

KEY WORDS:

Odour, Organic analysis, Chemoreceptor.

PRINCIPLE INVESTIGATOR AND AFFILIATION Professor M. Thompson, University of Toronto

LIAISON OFFICER OR SUPERVISOR O. Meresz

RESEARCH CATEGORY:

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

OBJECTIVE:

To develop a selective sensor for airborne organic species.

DESCRIPTION:

The interaction of supported and protected lipid films with airborne organics will be studied with a view to identifying electrochemical reactions and the required gel electrolyte films necessary to protect supported lipid membranes.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	39,470	15,000	3	1

SOURCE OF FUNDS:

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-15

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1981

PROJECT TITLE:

Multielement Determination of Metals and Metal Compounds in Air Samples

KEY WORDS: Multielement analysis, Mercury, Arsenic, gas chromatography - atomic fluorescence spectrometry.

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

LIAISON OFFICER OR SUPERVISOR J. Bishop/D. Balsillie

RESEARCH CATEGORY:

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

OBJECTIVE:

Development of sensitive analytical techniques for different chemical states of metals.

DESCRIPTION:

GC-AFS methods previously developed for lead and manganese compounds in air will be extended to mercury and arsenic compounds.

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

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
61,500	16,000	4	1.3

SOURCE OF FUNDS:

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-16

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1981

PROJECT TITLE:

Asbestos Air Pollution in the Outdoor Air in Ontario

KEY WORDS: Asbestos, Sampling, Analysis

PRINCIPLE INVESTIGATOR AND AFFILIATION professor D. Verma, McMaster University

LIAISON OFFICER OR SUPERVISOR P. Roberts/D. Corr

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

OBJECTIVE:

To obtain by electron microscopy baseline data for asbestos levels in outdoor air and relate these exposure levels to those obtained by traditional optical microscopy.

DESCRIPTION:

Asbestos levels in various situations will be measured both by e.m. and optical microscopy.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	80,000	20,000	3	1

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:

NO

REMARKS:

Ministry of the Environment
Ontario

AR-17

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1981

PROJECT TITLE:
Characterization of Airborne Particulate Matter

KEY WORDS:
Particulate, Aerosol, Dichotomous Sampler

PRINCIPLE INVESTIGATOR AND AFFILIATION: D. Corr, M.O.E.

LIAISON OFFICER OR SUPERVISOR

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

OBJECTIVE: To evaluate the performance of "inhalable particulate samplers" under Ontario conditions.

DESCRIPTION:

Several different models of dichotomous sampler, a size selective inlet hivol and other particulate samplers are being operated in downtown Toronto. the collected samples are being analyzed for several parameters and the results from the different samples will be correlated.

DURATION OF PROJECT: 2 YEARS

PRESENT YEAR IS: 2 YEAR

REPORTING DATE: 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	80,000	40,000	2	1

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

AR-18

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July,1981

PROJECT TITLE:
Organic Airborne Particulate Matter

KEY WORDS: Particulate, Aerosol, Organic

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. W.C. Tam

LIAISON OFFICER OR SUPERVISOR:

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

OBJECTIVE:
To develop a practial, accurate sampling method for organic airborne particulate matter, particularly PAH.

DESCRIPTION:

Two types of sampler will be compared a) impingers, some of which will be cooled b) filter samplers employing a moving filter tape.

DURATION OF PROJECT: 2 YEARS

PRESENT YEAR IS: 1 YEAR

REPORTING DATE: 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	70,000	35,00	2	1

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

AR-19

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1981

PROJECT TITLE:
Organic Vapour Sampling

KEY WORDS:
Organic Vapour, Sampling

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. A. Szakolcai

LIAISON OFFICER OR SUPERVISOR:

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

OBJECTIVE:
To develop a simple, accurate method of sampling organic vapours.

DESCRIPTION:
An organic vapour dynamic standards generator will be used to examine different adsorbent tube - pump combinations to determine breakthrough characteristics and proper sample handling procedures.

DURATION OF PROJECT: 2 YEARS

PRESENT YEAR IS: 3 YEAR

REPORTING DATE: 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	75,000	45,000	2	1

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

IS A REPORT ANTICIPATED?
YES

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ontario of the Environment

RESEARCH AND DEVELOPMENT INVENTORY AR-20

BRANCH: Air Resources & Laboratory Services & Waste Management *DATE:* 29/7/81

PROJECT TITLE: Trace Organic Contaminants

KEY WORDS: Waste Incineration, Polychlorinated Dibenzo Dioxins (PCDDs) Polychlorinated Dibenzo Furans (PCDFs), Chlorinated Aromatics, PCBs

PRINCIPLE INVESTIGATOR AND AFFILIATION F. Hopton - ORF
H. Tosine - M.O.E. Laboratory

LIAISON OFFICER OR SUPERVISOR V. Ozvacic, Project Co-ordinator

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

OBJECTIVE:

Determine appropriate quantities of PCDDs, PCDFs and other related species in all discharge streams into the environment at selected waste incinerator plants, identify likely precursors in the feedstock, develop measurement technology and monitor development of related health standards.

DESCRIPTION:

Sampling will be perfomed at the following incinerators;

- Commissioners Street municipal incinerator in Toronto
- Ashbridges Bay sewage sludge incinerator in Toronto
- SWARU in Hamilton
- Thermal Oxidizer at the Dow plant in Sarnia

Sampling and preparation of uncleaned sample extracts is being done by an outside consultant. Analyses and method development is performed in-house and development of health standards is the responsibility of the Ministry of Labour.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* June 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$309,000	$234,000	2	1

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* 1 *OTHER* —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
Ministry of Energy, Co-sponsors
Ministry of Labour, Health Effects Studies

REMARKS:

Ministry of the Environment
Ontario

HC-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Hazardous Contaminants Office *DATE:* July 14, 1981

PROJECT TITLE:
Intra-Deritoneal Injection of Chemicals in Fish

KEY WORDS:
Intra-Deritoneal Injection, Aquatic Toxicity

PRINCIPLE INVESTIGATOR AND AFFILIATION
Ian Smith - Research Consultant

LIAISON OFFICER OR SUPERVISOR
C. E. Duncan, Co-Ordinator - Hazardous Contaminants

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

OBJECTIVE:
To determine the LD50 of certain organic compounds on rainbow trout by intraderitoneal injection.

DESCRIPTION:
Review literature and select various compounds to be used in determining the LD50.
Compare toxicity of different classes of organic compounds and determine toxicity interaction of mixtures of similar and different class compounds.
Above information to be used for screening compounds for the Ozburn project.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* August 31, 1981

BUDGET:

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

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

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:
No

REMARKS:

Ministry of the Environment
Ontario

HC-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Hazardous Contaminants Office

DATE: July 14, 1981

PROJECT TITLE: Aquatic Toxicity Studies of Multiple Organic Compounds

KEY WORDS: Aquatic, Toxicity, Organic, Compounds

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

LIAISON OFFICER OR SUPERVISOR: G. Craig

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

OBJECTIVE:

To determine toxicity of various multiple organic compounds to fish.

DESCRIPTION:

To review literature in order to select compounds having limited aquatic toxicity information.

Analytical and test protocols will then be verified.

The chemicals must be non mutagenic or carcinogenic.

Flag fish and rainbow trout will be tested to determine egg production and survival.

DURATION OF PROJECT: 1 *YEARS* *PRESENT YEAR IS* $16,000 *YEAR* *REPORTING DATE:* April 1, 1982

BUDGET:

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

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

This project funded by RAC, EPS and HC at a total cost of $108,327.

Ministry of the Environment
Ontario

LS-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* July 14, 1981

PROJECT TITLE: Determination of ammonia in acid precipitation samples by differential pulse polarographic method.

KEY WORDS: Ammonia, Acid Precipitation, D.P.P.

PRINCIPLE INVESTIGATOR AND AFFILIATION R.S. Sadana RS-8101

LIAISON OFFICER OR SUPERVISOR J.N. Bishop

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

OBJECTIVE:

1. To determine low level ammonia in acid precipitation samples by an electrochemical method and compare the results obtained by colorimetric procedure.
2. To apply the developed method to the analysis of drinking water and other samples requiring ppb ammonia determination.

DESCRIPTION:

A sensitive differential pulse polarographic (D.P.P.) method will be developed to determine sub-ppm amounts of ammonia present in acid rain samples, as its hexamethylenetriamine complex. These samples will be made alkaline and ammonia evolved will be measured by gas diffusion ammonia ion selective electrode. The results obtained will be compared with those by routine colorimetric procedure.

DURATION OF PROJECT 1/2 *YEARS* *PRESENT YEAR IS* 1981 *YEAR* *REPORTING DATE* June 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	11,000	5,500	1/2	1/4

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NONE

REMARKS:

Ministry of the Environment
Ontario

LS-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* July 14, 1981

PROJECT TITLE: Application of gas phase molecular absorption method to the determination of free ammonia in urine.

KEY WORDS: Ammonia, urine, automated, atomic absorption.

PRINCIPLE INVESTIGATOR AND AFFILIATION P.N. Vijan PV - 8102

LIAISON OFFICER OR SUPERVISOR J.N. Bishop

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

OBJECTIVE:

To develop a simple, automated, one step method for determining ammonia in urine.

DESCRIPTION:

Existing methods of determining ammonia in urine are too complicated in comparison with the suggested method. A 1:10 dilution of the urine sample will be poured in the sample cup and made to react with a saturated solution of potassium carbonate and the characteristic absorption signals of gaseous ammonia at 197.3 will be recorded. Possible interferences will be studied and recovery experiments will be carried out. The results will be compared with those obtained by approved methods such as conway diffusion method. The chemistry will be automated by the use of Technician sampler and proportioning pump. Atomic absorption spectrophotometer and an open ended quartz 'T' cell will be used for measurement of the absorbance signals.

DURATION OF PROJECT 1/2 *YEARS* *PRESENT YEAR IS* 1981 *YEAR* *REPORTING DATE* December 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	12,000	12,000	1/2	1/2

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NONE

REMARKS:

Ministry of the Environment
Ontario

LS-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* July 7, 1981

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 I.T.C. section does not have an acceptable method for determination of thallium at parts per billion concentrations. Measurable amounts of thallium have been detected in emissions from cement plants, some effluents and mine tailings as well as suspended air particulate matter .

A DPASV analytical method has been partly developed. Reducing and complexing agents will be used to eliminate lead, cadmium and iron interferences. Speciation of thallium has been accomplished. Precision and accuracy of the measurement step are satisfactory. The method will be applied to the determination of thallium in the above mentioned matrices.

DURATION OF PROJECT 102 ~~man days~~ *PRESENT YEAR IS* ~~1981~~ *YEAR* *REPORTING DATE* ~~July 1982~~

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	10,200	4,000	1/2	1/4

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Ministry of the Environment
Ontario

LS-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* July 14, 1981

PROJECT TITLE: Evaluation of microdiffusion technique for the extractionof fluoride from vegetation and soil.

KEY WORDS: Fluoride, microdiffusion, extraction, vegetation, soil ion selective electrode.

PRINCIPLE INVESTIGATOR AND AFFILIATION DR. J.C. Hipfner Project # JCH-8101

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 improved, simple and safe procedure for the determination of fluoride in vegetation and soil samples which will be comparable to the ignition/fusion technique but without its inherent hazards.

DESCRIPTION:

The current procedure for fluoride involves an ignition/fusion step followed by an automated distillation and colourimetric analysis. The procedure is hazardous in so far as it involves high temperatures and alkali fusion. A simple procedure requiring extractions by dilute acids,aqueous or buffer solutions at low temperatures (150°C) will eliminate most hazards and allow an automated I.S.E. measurement. Samples will be placed in a 47mm petri-dish wetted with 30% $HClO_4$ and heated over-night in an oven at 50°C. A filter paper impregnated with NaOH will be positioned in the petri-dish cover. Fluoride released from the sample as HF will be trapped on the filter paper and subsequently extracted with either a buffer solution or water for analysis by fluoride ion selective electrode.

DURATION OF PROJECT 1/4 years *PRESENT YEAR IS* May 1981 *REPORTING DATE* September 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	6,000	6,000	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: NONE

REMARKS:

Ministry of the Environment
Ontario

LS-5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* July 14, 1981

PROJECT TITLE: Speciation of arsenate and arsenite in waters.

KEY WORDS: Differential pulse 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 inorganic species 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 determine and preserve the two forms of arsenic at ppb concentrations. 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 - A.A.S. as a measurement technique. Accuracy and precision of the developed method will be established.
Hydrazine will be evaluated as a preservative for electroactive As (3+) form.

DURATION OF PROJECT 102 man days ~~YEARS~~ *PRESENT YEAR IS* 1981 YEAR *REPORTING DATE* December 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	10,200	5,000	1/2	1/4

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Ministry of the Environment
Ontario

LS-6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* July 14, 1981

PROJECT TITLE: Determination of arsenic by differential pulse cathodic stripping voltammetry in the presence of copper ions.

KEY WORDS: Arsenic, DPCSV, copper.

PRINCIPLE INVESTIGATOR AND AFFILIATION R.S. Sadana

LIAISON OFFICER OR SUPERVISOR J.N. Bishop

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

OBJECTIVE:

1. To determine arsenic in environmental samples in the presence of copper ions.
2. To develop a scheme to determine and differentiate organic arsenic species in natural waters.

DESCRIPTION:

The object of this project is to develop a new differential pulse cathodic stripping voltammetric (DPCSV) method for the determination of arsenic with a hanging mercury drop electrode; in the presence of copper ions. Instrumental conditions and solution chemistry will be optimized. The DPCSV technique will be applied to a variety of environmental matrices. A scheme to speciate arsenic in natural waters will also be developed. The accuracy and precision of DPCSV technique will be established.

DURATION OF PROJECT 1/2 YEARS *PRESENT YEAR IS* ——— YEAR *REPORTING DATE* July 1982

BUDGET:	*TOTAL DOLLARS*		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	11,000	5,500	1/2	1/4

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:

NONE

REMARKS:

Ministry of the Environment
Ontario

LS-7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* July 14, 1981

PROJECT TITLE:
An improved hydride - AA method for determining inorganic arsenic species in air particulate matter.

KEY WORDS: Extraction. Atomic absorption, hydride, Arsenic, Speciation.

PRINCIPLE INVESTIGATOR AND AFFILIATION P.N. Vijan PV - 8101

LIAISON OFFICER OR SUPERVISOR J.N. Bishop

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

OBJECTIVE:

1. To determine inorganic arsenic species in suspended air particulate matter and to simplify the chemical digestion procedure.

DESCRIPTION:

Whereas both trivalent and pentavalent forms of arsenic convert to hydrides at high acidities, only trivalent arsenic forms volatile hydride at pH 4. Extraction with pH 4 buffer such as potassium hydrogen pthallate will be attempted to determine As(3+). The acidity of this extract will then be increased to 6 N HCl and total arsenic determined. The difference between the two will give the pentavalent arsenic. Also a gentle alkaline extraction will be attempted to simplify the extraction procedure and thus avoid digestion losses.

DURATION OF PROJECT 1/2 *YEARS* *PRESENT YEAR IS* 1981 *YEAR* *REPORTING DATE* June 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	12,000	6,000	1/2	1/4

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NONE

REMARKS:

Ministry of the Environment
Ontario

LS-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* July 14, 1981

PROJECT TITLE: Development of a monitor for measuring lead in ambient air.

KEY WORDS: Atomic absorption, fluorescence, lead, nebulizer.

PRINCIPLE INVESTIGATOR AND AFFILIATION P.N. Vijan PV - 8103

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 instrument for monitoring lead in ambient air based on atomic absorption or laser excited fluorescence detection.

DESCRIPTION:

Currently lead is determined in air by a prior collection of suspended particulate matter on Hi-vol filters. It would be highly desirable to develop the capability of continuous monitoring. A high velocity air stream will be scrubbed with nitric acid nebulised into a glass column packed with glass beads. The solubilized lead will be continuously picked up by a sampler probe and processed through an automated system for lead hydride generation. The gaseous hydride of lead will be atomised in a heated quartz cell and the atomic absorption or the laser excited atomic fluorescence will be measured. The latter technique will be developed.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	50,000	10,000	1 1/2	1/2

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: University of Toronto

REMARKS:

Ministry of the Environment
Ontario

LS-9

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services and Pollution Control *DATE:* July 9, 1981

PROJECT TITLE:

U.V. Disinfection Study - Microbiological Aspects

KEY WORDS:
Ultraviolet, disinfection, sewage, microbiology

PRINCIPLE INVESTIGATOR AND AFFILIATION J. E. Pagel JEP 8101

LIAISON OFFICER OR SUPERVISOR L. T. Vlassoff

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

OBJECTIVE:

Selected microbial indicators and pathogenic bacteria will be enumerated to evaluate the applicability of U.V. disinfection for sewage effluents.

DESCRIPTION:

Phase 1:

Eight water pollution control plants (WPCP's) will be monitored. Densities of indicator bacteria and pathogens in effluents will be determined before and after U.V. disinfection at three dosages. The magnitude of any photo-reactivation effect will also be measured.

Phase 2:

An in-depth study will be carried out at four WPCP's using the optimal conditions and parameters determined in Phase 1. Long-term performance of U.V. disinfection technology will be evaluated in the second phase.

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

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	16,000	16,000	1.2	1.2

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

IS A REPORT ANTICIPATED?
Yes - internal report and possible publication

PARTICIPATION BY OTHER MINISTRIES:
No

REMARKS:

This study will provide supportive microbiology data for Standard Biological Laboratories' project (Title: Application of U.V. Disinfection Technology in Ontario WPCP Effluents. Funded by Provincial Lottery Grant).

Ministry of the Environment
Ontario

LS-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services

DATE: July, 1981

PROJECT TITLE:

One-Step Fecal Coliform Isolation and Enumeration

KEY WORDS:

Fecal coliform, enumeration, methodology

PRINCIPLE INVESTIGATOR AND AFFILIATION J.E. Pagel — JEP 8102

LIAISON OFFICER OR SUPERVISOR L. T. Vlassoff

RESEARCH CATEGORY:

INTERNAL x	*UNSOLICITED CONTRACT* —	*MULTI-YEAR PROJECT* —
GRANT —	*SOLICITED CONTRACT* —	*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 a variety of problems are associated with the methods presently available, this study is designed to develop a single-step method that can be used as 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* — *REPORTING DATE* December 1981

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		2,000	0.4	0.1

SOURCE OF FUNDS:

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

IS A REPORT ANTICIPATED?

Yes (Internal MOE report, possible publication)

PARTICIPATION BY OTHER MINISTRIES:

No

REMARKS:

Experimental work completed. Reporting of results transferred from A. Qureshi to J.E. Pagel.

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Ontario

LS-11

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* July 13, 1981

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, 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 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* 1981 *YEAR* *REPORTING DATE* Feb. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$30,000		3/4	

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

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

PARTICIPATION BY OTHER MINISTRIES: no

REMARKS:
Further work required on complete separation of all dioxin isomers

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LS-12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* July 13, 1981

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

KEY WORDS: capillary G.C., electron capture, fish analysis

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 investigate the feasibility of using capillary columns for the routine analysis of pesticides, herbicides and other halogenated organics in fish

DESCRIPTION:

Due to the low resolving capability of packed GC columns, interfering materials may not be fully separated from the compounds of interest. 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 provide a more accurate result.

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

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

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$10,000	$4,000	½	1/3

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: A statistical evaluation will be made to compare results obtained from fish extracts analyzed on both packed and capillary columns.

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Ontario

LS-13

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* July 13, 1981

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, 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 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* 1981 *YEAR* *REPORTING DATE:* Dec. 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$24,000	$14,000	1.1	3/4

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: no

REMARKS: Methodology has been developed for analysis of chloridioxins in water and fish

Ministry of the Environment
Ontario

LS-14

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch

DATE: July 20, 1981

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, 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 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 automated 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 industrial waste samples. It is proposed to evaluate specific capillary columns of various lengths for:

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

(b) Suitability for automated analysis

DURATION OF PROJECT: 3 *YEARS* — *PRESENT YEAR IS:* 1981 *YEAR* — *REPORTING DATE:* 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$20,000.	$6,000.	2.0	1/3

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:

Preliminary studies are proceeding on analysis of chlorinated aromatics and chlorophenols.

Ministry of the Environment
Ontario

LS-15

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* July 13, 1981

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, 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 on-going *YEARS* *PRESENT YEAR IS* 1981 *YEAR* *REPORTING DATE* Sept. 1981

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$20,000	$6,000	1.0	½

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

IS A REPORT ANTICIPATED? yes

PARTICIPATION BY OTHER MINISTRIES:

no

REMARKS: Current study involves clean-up procedures for water and vegetation prior to H.P.L.C. scan for carbamates and phenyl-ureas.

Ministry of the Environment
Ontario

LS-16

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services

DATE: July 13, 1981

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 P. Baulu, Pesticides Section

LIAISON OFFICER OR SUPERVISOR G.A.V. Rees

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

OBJECTIVE:

Evaluate and automate 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.

DURATION OF PROJECT 3 *YEARS* — *PRESENT YEAR IS* 1981 *YEAR* — *REPORTING DATE* October 1981

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$22,000		1.0	

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

IS A REPORT ANTICIPATED? preliminary report available

PARTICIPATION BY OTHER MINISTRIES: no

REMARKS: Preliminary report available: aminosilane columns (micro-NH_2) have been shown to separate PCB's from organochlorine pesticides.

Further study of column regeneration procedures is required before automation of the system.

Ministry of the Environment
Ontario

LS-17

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* July 13, 1981

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 - 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 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-instructinon course, it will be possible to construct electronic control devices and interface them with analogue components.

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

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$15,000	$2,000	½	1/10

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

IS A REPORT ANTICIPATED? Report available

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:
These electronic controls are functioning adequately within the automated water extractor, described as another project.

Ministry of the Environment
Ontario

LS-18

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* July 13, 1981

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

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

PRINCIPLE INVESTIGATOR AND AFFILIATION O.W. Berg, P. Baulu, Pesticide Section

LIAISON OFFICER OR SUPERVISOR G.A.V. Rees

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

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

DESCRIPTION:

A liquid-liquid extraction procedure using a Teflon helix coil as a mixing chamber will be evaluated for recovery of pesticides and PCB's. Fluid dynamics will be evaluated to ensure safety of sample bottle pressurization and optimize flow rates in the mixing chamber. Solvent/water ratio will be optimized and recovery studies conducted.

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

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

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

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$9000.		2/3	

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

IS A REPORT ANTICIPATED? Presentation at 1981 Pittsburgh Conference

PARTICIPATION BY OTHER MINISTRIES: no

REMARKS: Project complete, report available.

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Ontario

LS-19

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* July 13, 1981

PROJECT TITLE: Development of a sensitive screening technique for TCDD isomers in complex matrices using a triple quadrupole mass spectrometer

KEY WORDS: TCDD, triple quadrupole analyser

PRINCIPLE INVESTIGATOR AND AFFILIATION H. Tosine, Pesticides Section

LIAISON OFFICER OR SUPERVISOR

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

OBJECTIVE:

To develop and apply a rapid direct analytical method for the detection and quantitation of TCDD's in complex matrices such as fish and sediments using the newly developed TAGA 6000 triple quadrupole system by Sciex Inc.

DESCRIPTION:

A sensitive, rapid screening technique for TCDD will be developed using the triple quadrupole mass spectrometer system developed by Sciex, for complex samples such as fish & sediments. The TCDD will be unequivocably detected at ultra-trace (ppt) levels in the presence of PCBs, DDE and other chlorinated pesticides present at high ppb or ppm levels. This feature is not possible using ordinary mass spectrometers due to interferences at the TCDD masses. The final objective would be to make the method isomer specific

DURATION OF PROJECT 1½ *YEARS* *PRESENT YEAR IS* 1981 *YEAR* *REPORTING DATE* Dec./81

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$10,000	$1,500	½	1/10

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

* Sciex and MOE each funded their own contribution to project

IS A REPORT ANTICIPATED? yes, in scientific literature

PARTICIPATION BY OTHER MINISTRIES: no

REMARKS:

Project complete. Report presented at Mass Spectrometry Conference in May 1981 (by Sciex). Written report ready in December 1981.

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LS-20

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services *DATE:* July 13, 1981

PROJECT TITLE:
Investigation of HCl digestion/extraction of fish tissues for the analysis of PCB/OC

KEY WORDS: acid,HCl,digestion, OC/PCB, biota, fish

PRINCIPLE INVESTIGATOR AND AFFILIATION George Crawford, 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 evaluate the applicability of an acid extraction/digestion procedure to the analysis of fish and biota for OC/PCB residues.

DESCRIPTION:

Tests will be performed to determine the optimum conditions for complete tissue digestion and efficient OC/PCB recovery.

Recovery studies will be conducted with OC/PCB spiked fish to verify efficient extraction and adequate separation of PCB's from OC's prior to GC analysis.

If the procedure is proven feasible, a statistical comparison will be conducted of results obtained by acid digestion of fish with those yielded by the current extraction method

DURATION OF PROJECT 1½ *YEARS* *PRESENT YEAR IS* 1981 *YEAR* *REPORTING DATE* Sept. 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$10,000	$5,000	½	½

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

IS A REPORT ANTICIPATED? yes

PARTICIPATION BY OTHER MINISTRIES: no

REMARKS:

Acid digestion appears promising for extraction of fish. Results obtained by acid digestion will be compared with those from the current procedures.

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LS-21

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch *DATE:* August 4, 1981

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

KEY WORDS: Organic carbon analysis, River, Wastewater, Suspended Solids

PRINCIPLE INVESTIGATOR AND AFFILIATION J. Crowther, Water Quality Section JC 7501

LIAISON OFFICER OR SUPERVISOR S. Villard

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

Availabe 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* 5 *YEAR* *REPORTING DATE* April, 1982

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$18,000		36 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: After evaluation, the use of the Be kn an Total Carbon analyzer was abandoned as the instrument was imprecise inaccurate and unstable a procedure for determining dissolved organic and dissolved inorganic carbon was developed, and a report was issued.

cont'd on reverse

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RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch *DATE:* August 4, 1981

PROJECT TITLE: Acidity Component Fractionation.

KEY WORDS: Acidity, precipitation

PRINCIPLE INVESTIGATOR AND AFFILIATION: F. TOmassini, Water Quality Section WQS 8002

LIAISON OFFICER OR SUPERVISOR: S. Villard

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

OBJECTIVE:

To establish a standard methodology for determining the major acidic components in precipitation samples collected under the APIOS program.

DESCRIPTION:

The following studies will be undertaken with the anticipated result of providing a standard methodology which provides as much information as possible regarding the acidity of precipitation samples:

a) development of an adequate quality control program for acidity.
b) determining the effect of various methodologies on the carbonic acid component in precipitation samples.
c) an attempt to evaluate the contribution of strong and weak acids to the overall acidity of precipitation samples.

DURATION OF PROJECT: 2 YEARS *PRESENT YEAR IS:* 1st YEAR *REPORTING DATE:* December 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$10,000	5,000	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: A quality control program has been established and a revised methodology for the determination of strong acid acidity in precipitation samples has been written.

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LS-23

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch *DATE:* August 4, 1981

PROJECT TITLE: Asbestos leaching in AC pipes.

KEY WORDS: Asbestos; asbestos cement pipe; scanning electron microscope.

PRINCIPLE INVESTIGATOR AND AFFILIATION: P. Roberts, Water Quality Section WQS 8003

LIAISON OFFICER OR SUPERVISOR: S. Villard

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

OBJECTIVE:

To determine the effects of aggressive (low alkalinity/hardness) water on the internal surface of asbestos cement pipe.

DESCRIPTION:

Sections of asbestos cement pipe will be obtained from locations where the asbestos concentration in the water increases after passing through the pipe. The internal surface of the pipe will be compared with unused sections to determine the nature of the damage.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* June 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$1,500	1,000	.07	.05

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

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RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch *DATE:* August 4, 1981

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, Water Quality Section 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 2 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* March, 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$3,000	3,000	0.25	0.20

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: This project is currently at stage 3. A distillation apparatus is under construction and will be evaluated.

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LS-25

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch *DATE:* August 4, 1981

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, Water Quality Section 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 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 3 YEARS *PRESENT YEAR IS* 2nd YEAR *REPORTING DATE* Dec. 1982

BUDGET:

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

REMARKS: that part of objective b which deals with chrysotile asbestos has been completed and the results will be published in the scientific literature. The stability of asbestos suspensions is now being investigated.

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RESEARCH AND DEVELOPMENT INVENTORY

LS-26

BRANCH: Laboratory Services Branch

DATE: August 4, 1981

PROJECT TITLE: Chlorinated Species Measured by the Amperometric Titrator

KEY WORDS:

PRINCIPLE INVESTIGATOR AND AFFILIATION: S. Wisz, Water Quality Section 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 measured by the amperometric titration.

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: 4 YEAR — REPORTING DATE: November 198

BUDGET:	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$6,000	3,000	4 months	2 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:

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Ontario

LS-27

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch DATE: August 4, 1981

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, Water Quality Section 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 procedures to identify and distinguish between mineral species.

DESCRIPTION: There is increasing evidence that mineral fibres other than asbestos are capable of producing mesothelioma and other "asbestos-related" diseases in laboratory animals and most recently humans. Since asbestos was first recognized as a human carcinogen efforts have been made to find substitutes for its many application , 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 & fibrous materials that are used commercially.
2. To characterize those fibrous materials 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 system for positive identification of minerals.

DURATION OF PROJECT: 2 YEARS PRESENT YEAR IS: 3rd YEAR REPORTING DATE: Dec. 1982

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:

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LS-28

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch *DATE:* August 4, 1981

PROJECT TITLE: Controller for an Automated Ion Chromatograph System.

KEY WORDS: Controller, automation, ion chromatograph

PRINCIPLE INVESTIGATOR AND AFFILIATION M.W. Rawlings, Water Quality Section 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 an 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 PET microcomputer will be used to generate the timing and control signals. The control signals will be transmitted via solid state relays. The circuitry will be our design. The chromatographic column valves will be controlled by electrically operated 3-way air solenoid valves.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* August 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$3,500	3,500	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: The interface has been completed and tested. All other equipment is on site. Software development will begin immediately. 23/07/81.

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LS-29

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch

DATE: August 4, 1981

PROJECT TITLE: Construction of a microprocessor controlled ion chromatograph.

KEY WORDS: ion chromatograph.

PRINCIPLE INVESTIGATOR AND AFFILIATION: MR. F. Tomassini, Mr. M. Rawlings, Water Quality Sectio WQS 8101

LIAISON OFFICER OR SUPERVISOR: S. Villard

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

OBJECTIVE: 1. To construct initially, a manually operated ion chromatograph from readily available components, having the sensitivity & precision of commercially available units but at a substantial cost saving.

2. To automate the unit to achieve the best possible throughput with the least amount of operator time. Note: The completion of this task is directly dependent on the success of project MWR 8001.

DESCRIPTION: The use of ion chromatography as an analytical method has gained wide acceptance in recent years, particularly for the analysis of low ppm levels of SO_4 in precipitation samples and surface waters. Commercially available units are prohibitively expensive to be considered as a routine methodology for a high capacity laboratory. This project will attempt to construct an ion chromatograph from commercially avialable components. The cost effectiveness of this project will be realized with the construction of more than one system and its success will make ion chromatography accessible to the regional laboratories.

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS: 1 YEAR — REPORTING DATE: ~~Dec. 31, 1982~~

BUDGET:	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	10,000	7,500	0.75	0.50

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

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LS-30

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch *DATE:* August 4, 1981

PROJECT TITLE: Determination of Bromide by Ion Chromatography.

KEY WORDS: Bromide, ion chromatography, precipitation.

PRINCIPLE INVESTIGATOR AND AFFILIATION J. Crowther, Water Quality Section 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 months	5 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: Chemical treatment to remove nitrate interference was shown to be effective. Recently a technique has appeared in the literature whereby anions are separated into major groups as a preliminary inline step in analyses. This concept will be investigated for bromide as such a system would reduce manpower requirements.

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RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch *DATE:* August 4, 1981

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

KEY WORDS: Chlorophyll

PRINCIPLE INVESTIGATOR AND AFFILIATION: M. Rawlings/W.B. Moody, Water Quality Section 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:* Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$12,000	6,000	6months	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:

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LS-32

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch *DATE:* July 30, 1981

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

KEY WORDS: Flow Injection Analysis.

PRINCIPLE INVESTIGATOR AND AFFILIATION: J. Crowther, Water Quality Section 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 (FIA) 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 techniques characteristic of 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). Existing colorimetric methods will be employed to confirm speed of analysis and determine variables associated with adopting this new technique for routine testing.

DURATION OF PROJECT: 3 *YEARS* *PRESENT YEAR IS* 3 *YEAR* *REPORTING DATE:* April 1982

BUDGET:

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

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: The rate of FIA analysis has been confirmed. A novel variation of FIA has been developed, and applied successfully to chloride. analyses; the latter includes a reference channel. Current experimental studies involve evaluating equipment modules and developing a procedure for silicates.

Ministry of the Environment
Ontario

LS-33

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch *DATE:* July 30, 1981

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: W.B. Moody, Water Quality Section FPD 7503

LIAISON OFFICER OR SUPERVISOR: S. Villard

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

OBJECTIVE:

A recovery study of various phenols by our present 4-AAP Method.

DESCRIPTION:

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

Various phenolics will be collected and analyzed using our present method. Special emphasis will be placed on chlorophenols since they may contribute to taste and odor problems. Focus will also be placed on the consensus voluntory reference compounds (CVRC's) as approved by the ACS Division of Environmental Chemistry.

DURATION OF PROJECT: OPEN YEARS *PRESENT YEAR IS:* 5 YEAR *REPORTING DATE:* Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	3,500	3,500	3 months	5 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 *DATE:* August 4, 1981

PROJECT TITLE: Biological Oxygen Demand Measurements.

KEY WORDS: BOD_5, Ultimate BOD, K-Rates, Probes, DO Measurements.

PRINCIPLE INVESTIGATOR AND AFFILIATION: J. Crowther/B. Cheung, Water Quality Section WQS 8005

LIAISON OFFICER OR SUPERVISOR: S. Villard

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

OBJECTIVE:
To expand the scope and improve the quality of biological oxygen demand measurements.

DESCRIPTION: Background: 1) The current BOD_5 procedure has not been evaluated for a number of years, and a recent quality control study indicated problems with 2) DO measurements, the heart of BOD_5 analyses 3) K-Rates, by the manual procedure are so time consuming that the lab cannot meet field requirements, 4) Blanking systems for BOD_5 analyses have appeared in the literature, and should be evaluated. 5) Nitrogen Oxygen demand (NOD) data has proven necessary for some field studies.

APPROACH:
1) Step by step check of BOD_5 procedure for both clean and dirty samples.
2) Evaluate DO techniques and improve QC procedures.
3) Semi-automate ultimate BOD and K-Rate procedures.
4) Evaluate blank correction techniques.
5) Develop data bank for NOD measurements and evaluate current techniques.

DURATION OF PROJECT: 2 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE:* April 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$20,000	3,000	12 months	4 months

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: Sections 2 and 4 have been completed and reports have been issued; Section 1 has been completed for sewage samples, and a report has been issued. Experimental data for Section 3 is being accumulated.

Ministry of the Environment
Ontario

LS-35

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch *DATE:* July 27, 1981

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 D.O. Migus, Water Quality Section AAH 7804

LIAISON OFFICER OR SUPERVISOR S. Villard

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

OBJECTIVE:

1. To develop an optimal procedure for determining the concentration of asbestos fibres collected on delbag filters.
2. To compare the precision and accuracy of the method with those of the 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 an appropriate organic solvent 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* July 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: SEE OTHER SIDE

REMARKS:

Upon evaluation of numerous organic solvents, ethyl acetate was chosen to be the most appropriate organic solvent for dissolution of the Delbag filter. The level of asbestos in blank Delbag fiters was tested and found to be unacceptable. Presently, a final report is being written outlining the unsuitability of delbag filters for asbestos determination.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 1

BRANCH: Pesticides Advisory Committee *DATE:* July 1981

PROJECT TITLE:

Smut on fall panicum

KEY WORDS: Biological control. Smut. Fall panicum

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. J. F. Alex - Department of Environmental Biology, U. of Guelph

LIAISON OFFICER OR SUPERVISOR Pesticides Advisory Committee

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

OBJECTIVE:

a) To identify the purple smut which occurs naturally on fall panicum in isolated localities in Ontario.
b) To describe the morphology of the organism.
c) To determine how to culture the organism on fall panicum.
d) To attempt to culture the organism on related wild grasses and on commercial grain crops.

DESCRIPTION: Fall panicum, Panicum dichotomiflorum var. geniculatum is one of the most important annual grass weeds in corn in southern Ontario. It is tolerant of many of the herbicides in regular use and has been increasing in abundance as well as spreading into new districts. In a few localities in Ontario, fall panicum has been attacked by a purple smut.

The smut is worthy of examination as a potential biocontrol agent for fall panicum and the first step towards achieving that goal would be identification of the agent and learning to culture it.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$5,500	$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 Pesticides Advisory Committee

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 2

BRANCH: **Pesticides Advisory Committee** *DATE:* July 1981

PROJECT TITLE: **A study of the control of the Carpenter Ant.**

KEY WORDS: **Carpenter Ants. Control**

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

LIAISON OFFICER OR SUPERVISOR **Pesticides Advisory Committee**

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

OBJECTIVE:

To study the control of the carpenter ant, Camponotus spp., and thus improve the efficiency of the structural pest control industry in controlling this insect.

DESCRIPTION:

This insect is causing increased amounts of damage to homes in Southern Ontario as changes in life style, housing construction, and the age of trees are providing new habitats.

The research will show which chemical can be used, should chlordane no longer be available for control of this pest, and the best method for extermination will be determined.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$11,500	$11,500		

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

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 3

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1981**

PROJECT TITLE:

Behaviour of aldicarb (Temik) in soil.

KEY WORDS: **Insecticide. Aldicarb. Activity. Soil.**

PRINCIPLE INVESTIGATOR AND AFFILIATION **Dr. R. A. Chapman**
University of Western Ontario, London

LIAISON OFFICER OR SUPERVISOR **Pesticides Advisory Committee**

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

OBJECTIVE: **1) complete studies outlined in the 1980 proposal; and 2) conduct additional studies on the persistence of aldicarb and its metabolities in soil and in water as follows:**

a) Complete laboratory studies on the activity and persistence of aldicarb, and the sulfoxide and sulfone in soil.
b) Set up a new field study on the persistence of aldicarb in mineral and organic soil under conditions of both high and low soil moisture.
c) Conduct laboratory studies on the persistence of aldicarb, aldicarb sulfoxide, and aldicarb sulfone in water relative to pH, microbial activity and temperature.

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. Sebsequently 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 available 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 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* **Progress Report** ~~**Dec. 1981**~~

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$23,900	$14,900		

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

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY **PAC - 4**

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1981**

PROJECT TITLE: **Weed monitoring techniques for the detection of specific periods of crop interference to reduce or eliminate herbicide usage.**

KEY WORDS: **Weed monitoring. Crop interference. Reduction of herbicide usage.**

PRINCIPLE INVESTIGATOR AND AFFILIATION **Dr. J. Dekker**
Department of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR **Pesticides Advisory Committee**

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

OBJECTIVE: **1) monitor for exact periods of quackgrass-induced stress on soybeans, 2) use this information, as it occurs, to time the application of sub-lethal doses of selective chemicals, or physical (cultivation) control measures, to slow the quackgrass growth during this stress period; 3) to evaluate soybean yield data to determine if these monitoring techniques and alternative control measures have a potential for reducing or eliminating herbicide usage on quackgrass in soybeans.**

DESCRIPTION:

A research program aimed at monitoring "stress-degree day" accumulation through the cropping season with an infra-red thermometer could pinpoint the exact periods the crops experienced these stresses. Additionally, plants could be periodically subjected to plant tissue analysis for nitrogen phosphorus and potasium. The coupling of these two measurements could reveal exact periods of crop stress due to interference for water, and nutrients. This empirical information then could be used to time one of several alternate weed control strategies. Alternate chemical control measures, physical control measures, or sub-lethal chemical measures could be utilized to stop weed growth for the weed stress period only. The development of this pest monitoring technique to control measures could potentially replace full season control measures with no loss of grain yield.

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

BUDGET:

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

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

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY **PAC - 5**

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1981**

PROJECT TITLE:
Persistence of the systemic fungicide metalaxyl in soils.

KEY WORDS: **Systemic fungicide. Persistence. Soils.**

PRINCIPLE INVESTIGATOR AND AFFILIATION **Dr. L. V. Edgington**
Department of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR **Pesticides Advisory Committee**

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

OBJECTIVE:

1. To determine the rate of breakdown of metalaxyl in three different soil types: muck soil (Holland Marsh), loam (Ridgetown) and sandy soil (Delhi), using various rates and different application techniques.

2. To determine metalaxyl residues in different plants grown on treated soil or from treated seed: lettuce, soybeans and tobacco, respectively.

DESCRIPTION:

Nothing is known about persistence and breakdown of metalaxyl in different soil types, although a season-long control of lettuce downy mildew obtained by a single granular application at seeding time may indicate that metalaxyl is quite persistent in muck soil.

Lettuce, soybeans and tobacco are planted in their particular soil. Metalaxyl will be applied as seed treatments, in-furrow granules, in-furrow dusts and broadcast. Periodically soil samples and plant material will be taken for analysis. Especially residues at harvest time and the carry-over of fungicide in soil to the next crop will be determined.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$7,700	$7,700		

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

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 6

BRANCH: **Pesticides Advisory Committee** *DATE:* July 1981

PROJECT TITLE: **Determination of the cause of poor efficacy of insecticides used for control of rootworms.**

KEY WORDS: **Insecticides. Efficacy. Rootworms.**

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

LIAISON OFFICER OR SUPERVISOR **Pesticides Advisory Committee**

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

OBJECTIVE: **To determine the cause of poor efficacy of insecticides used for control of rootworm in Ontario.**

DESCRIPTION:

1. **Evaluate various "faulty" methods of application to determine how much they contribute to poor control on farms. Specifically to investigate; a) direct application into the seed furrow vs. banding as recommended, b) the effect of the dragging chain between the spreader and press wheel on incorporation and control.**

2. **Screen northern and western corn rootworms from farms where problems have been reported to determine whether resistance has developed.**

3. **Monitor pesticide residues of carbofuran and terbofos on three farms to determine the persistance of insecticidal residues under field conditions.**

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress Report ~~December 1981~~

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$17,800	$7,800		

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

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY **PAC - 7**

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1981**

PROJECT TITLE: **Control of mosquitoes with planaria.**

KEY WORDS: **Mosquitoes. Catch basins. Planarian flatworms**

PRINCIPLE INVESTIGATOR AND AFFILIATION: **Dr. J. A. George, University of Western Ontario, London**

LIAISON OFFICER OR SUPERVISOR: **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. **Determine if planaria survived the winter in the 27 catch basins inoculated in 1980.**
2. **Determine what conditions are associated with large, or reduced, numbers of planaria in catch basins.**
3. **Introduce known numbers of first instar larvae and planaria into simulated catch basins and determine the effects of planaria on the numbers of adults that reach eclosion under variable conditions.**
4. **Determine the conditions that affect the proportion of planaria on styrofoam floats.**
5. **Determine if there are other species of planaria in Ontario which feed on mosquito larvae.**
6. **Develop methods of mass rearing and determine how to induce "coccoon" formation.**
7. **Publish.**

DURATION OF PROJECT: 3 *YEARS* — *PRESENT YEAR IS* 3rd *YEAR* — *REPORTING DATE* Progress Report ~~Dec. 1981~~

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$22,800	$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 Pesticides Advisory Committee.**

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY **PAC - 8**

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1981**

PROJECT TITLE: **Weather-timed fungicide schemes for vegetable crops.**

KEY WORDS: **Weather. Timing. Fungicides. Vegetable crops.**

PRINCIPLE INVESTIGATOR AND AFFILIATION **Dr. T.J. Gillespie, Land Resource Science**
Dr. J.C. Sutton, Environmental Biology **University of Guelph**

LIAISON OFFICER OR SUPERVISOR **Pesticides Advisory Committee**

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

OBJECTIVE:

1. To complete development of the microcomputerized weather monitoring device.
2. To test the microcomputerized weather-monitoring device for timing fungicides to control Botrytis leaf blight in onions.
3. To examine effectiveness of systemic fungicides applied as seed treatments in delaying epidemics of Botrytis leaf blight in onions.

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 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress Report Dec. 1981

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$17,000	$9,500		

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

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 9

BRANCH: Pesticides Advisory Committee *DATE:* July 1981

PROJECT TITLE: Timing and cost effectiveness of sprays to control white mold on white beans.

KEY WORDS: White mold. White beans. Cost effectiveness.

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. R. Hall, Department of Environmental Biology, U. of Guelph

LIAISON OFFICER OR SUPERVISOR Pesticides Advisory Committee

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

OBJECTIVE: To conduct large-scale field trials on chemical control of white mold of white beans to determine:

a) cost-effectiveness of one spray application.

b) time of application that gives maximum disease control.

DESCRIPTION: White mold of white beans is caused by the fungus Sclerotinia sclerotiorum. This disease is estimated to cause annual losses between 5% and 10%. On individual fields losses can approach 100%. This disease has received high priority for research from the Ontario Field Bean Committee for several years. Chemicals such as Benlate, Botran, Bravo and Easout are applied from ground rigs, helicopters or aeroplanes Up to $200,000. may be spent per year in Ontario applying chemicals. There is concern that chemicals are not being applied at the most appropriate time and that yield returns do not justify the cost of spraying. Tests over many years on small plots have shown that several chemicals can control the disease. Present needs addressed in this proposal relate to timing and cost-effectiveness of spraying.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$5,300	$5,300		

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

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY **PAC - 10**

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1981**

PROJECT TITLE:
Integrated Pest Management in Ontario

KEY WORDS: **IPM** **Ontario**

PRINCIPLE INVESTIGATOR AND AFFILIATION **The Ontario Apple Commission**

LIAISON OFFICER OR SUPERVISOR **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 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress Report Dec. 1981

BUDGET:

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 11

BRANCH: Pesticides Advisory Committee *DATE:* July 1981

PROJECT TITLE: Losses in production of potatoes, rutabagas, and onions attributable to insects, diseases, and weeds.

KEY WORDS: Food losses. Pests. Vegetable crops.

PRINCIPLE INVESTIGATOR AND AFFILIATION Drs. D.G.R. McLeod and J.H. Tolman
University of Western Ontario, London, Ontario

LIAISON OFFICER OR SUPERVISOR Pesticides Advisory Committee

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

OBJECTIVE: To determine losses caused by pests (insects, diseases and weeds) to three crops - potatoes ($30,000,000), rutabagas ($5,000,000), and onions ($7,000,000) - of economic importance in Ontario.

DESCRIPTION: Three 1/2 - 1 acre parcels of land suitable for production of potatoes (sandy loam), rutabagas (clay loam), and onions (muck) will be rented in the London area. Plots will be established each year and seeded with one of the most commonly used varieties of each crop. Pesticides applied will be those commonly used by growers. Treatments will be applied as follows: 1) No treatment; 2) Herbicide + fungicide (crop loss due to insects); 3) Herbicide + insecticide (crop loss due to diseases); 4) Insecticide + fungicide (crop loss due to weeds); 5) Insecticide + fungicide + herbicide. Each set of treatments will be replicated four times. Observations will be made through the growing season on the incidence and intensity of pest populations. Yields will be taken at harvest and converted to $ values based on market prices of the crops.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress Report Dec. 1981

BUDGET:

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

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

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY **PAC - 12**

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1981**

PROJECT TITLE: **Development of Sex Attractant Traps for monitoring changes in low density spruce budworm populations as a means of implementing early intervention management strategies.**

KEY WORDS: **Spruce Budworm. Population. Sex attractant traps.**

PRINCIPLE INVESTIGATOR AND AFFILIATION **Dr. C. J. Sanders**
Dept. of Biology, The Sault College of Applied Arts & Technology

LIAISON OFFICER OR SUPERVISOR **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 2 *YEARS* — *PRESENT YEAR IS* 2nd *YEAR* — *REPORTING DATE* Progress Report Dec. 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$24,200	$11,200		

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

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 13

BRANCH: Pesticides Advisory Committee *DATE:* July 1981

PROJECT TITLE: An investigation of the European skipper and the northern corn rootworm as competitors of foraging honey bees.

KEY WORDS: European skipper. Northern corn rootworm. Honey bees.

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. M. V. Smith - Department of Environmental Biology University of Guelph

LIAISON OFFICER OR SUPERVISOR Pesticides Advisory Committee

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

OBJECTIVE: To carry out an ecological survey to try to determine the inter-relationship between high populations of adult European skippers or corn rootworm beetles, and foraging honey bees.

DESCRIPTION: Localized outbreaks of the European skipper sometimes result in large numbers of adult butterflies swarming over plant blossoms in search of nectar. For some years, beekeepers in these areas have complained that during the 2-3 week period when the skippers are active, their honeybee colonies cease to gather surplus nectar.

The larval stage of the skipper has long been recognized as a pest of grass forage crops. If the adult also poses a threat as a competitor of foraging honey bees, this would be an added reason for undertaking control measures.

The large acreages of corn currently grown in southern Ontario have resulted in a considerable buildup of populations of the northern corn rootworm. In some areas the small green adult beetles become so numerous in late summer that a dozen or more may occur on single inflorescences. Some beekeepers feel that the fall honey flow is greatly reduced when these insects are present in large numbers on goldenrod and aster blossoms.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$ 3,700	$ 3,700		

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

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY **PAC - 14**

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1981**

PROJECT TITLE:

Persistence of phenoxy herbicides in forestry and agricultural soils in southern and northern Ontario.

KEY WORDS: **Phenoxy herbicides. Persistence. Forestry & Agricultural soils**

PRINCIPLE INVESTIGATOR AND AFFILIATION **Drs. G. R. Stephenson & K. R. Solomon**
Dept. of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR **Pesticides Advisory Committee**

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

OBJECTIVE:

To compare the soil persistence of 2,4-D and dichlorprop under actual field conditions with similar soils from a southern and northern Ontario agricultural site and northern Ontario forestry sites.

DESCRIPTION:

With recent restrictions on the use of 2,4,5-T in Ontario and some other provinces, dichlorprop has become an important alternative for use with 2,4-D for weed and brush control in non-crop areas. Its persistence and environmental impact are thought to be similar to 2,4-D but there are so few studies involving dichlorprop that this cannot be confirmed. With the loss of 2,4,5-T, 2,4-D is the only herbicide allowed for use in forestry for conifer release programs.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* PROGRESS REPORT DEC. 1981

BUDGET:

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

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

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 15

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1981**

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, Dr. J. H. Tolman — University of Western Ontario, London, Ontario**

LIAISON OFFICER OR SUPERVISOR **Ontario Pesticides Advisory Committee**

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

OBJECTIVE:

1. To identify native parasites and predators of the onion maggot.
2. To identify parasites and predators of the onion maggot occuring 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 2 *YEARS* — *PRESENT YEAR IS* 2nd *YEAR* — *REPORTING DATE* PROGRESS REPORT DEC. 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$26,300	$14,300		

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

IS A REPORT ANTICIPATED?

Report prepared annually by the Pesticides Advisory Committee.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 16

BRANCH: Pesticides Advisory Committee *DATE:* July 1981

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 - Department of Environmental Biology University of Guelph

LIAISON OFFICER OR SUPERVISOR 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 3 *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* Progress Report Dec. 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$25,770	$10,500		

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

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 17

BRANCH: Pesticides Advisory Committee *DATE:* July 1981

PROJECT TITLE:

Toxicity of herbicides to rainbow trout.

KEY WORDS: Aquatic herbicides. Sublethal doses. Rainbow trout.

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. C. I. Mayfield - Department of Biology
University of Waterloo, Waterloo, Ontario

LIAISON OFFICER OR SUPERVISOR Pesticides Advisory Committee

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

OBJECTIVE: 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.

DESCRIPTION:

Herbicides to be used in this study include dicamba, dichlorprop, and picloram.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$21,400	$10,900		

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

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY **PAC - 18**

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1981**

PROJECT TITLE: **Influence of environmental factors on the rate of microbial degradation of pesticides in soil and water.**

KEY WORDS: **Pesticides Microbial degradation Soil Water**

PRINCIPLE INVESTIGATOR AND AFFILIATION **Dr. C. M. Tu**
University of Western Ontario, London, Ontario

LIAISON OFFICER OR SUPERVISOR **Pesticides Advisory Committee**

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

OBJECTIVE: **The influence of environmental factors on the rate of microbial degradation of pesticides, placing first emphasis on temperature effects. The necessary techniques to conduct these studies have been developed in earlier work (funded in part by the Pesticides Advisory Committee).**

DESCRIPTION:

Specifically, to investigate the persistence of chlorpyrifos and chlorfenvinphos in sterile and natural soil and sterile and natural water under different temperature conditions.

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

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 the Pesticides Advisory Committee**

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 19

BRANCH: Pesticides Advisory Committee *DATE:* July 1981

PROJECT TITLE:

Control of Voles in Ontario orchards.

KEY WORDS: Voles. Control. Orchards.

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. R. J. Brooks - Department of Zoology - University of Guelph

LIAISON OFFICER OR SUPERVISOR Pesticides Advisory Committee

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

OBJECTIVE:

1. To establish the extent of rodent damage and the identity of the species responsible for the damage in four study areas across Ontario.
2. To relate the extent of damage and size of vole populations to existing agronomic practices.
3. To test the effectiveness of various forms of vegetative cover as means of controlling vole numbers.

DESCRIPTION:

As above.

See also PAC - 20

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress Report Dec. 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	?	$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 Pesticides Advisory Committee

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: This study is also being funded in part by the Ministry of Agriculture and Food and the Ontario Apple Commission.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 20

BRANCH: Pesticides Advisory Committee *DATE:* July 1981

PROJECT TITLE: Meadow mice control in orchards.

KEY WORDS: Meadow mice. Control. Orchards.

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. Z. Siddiqi, Chemical Research International, Toronto

LIAISON OFFICER OR SUPERVISOR Pesticides Advisory Committee

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

OBJECTIVE:
Evaluate the most recent anticoagulants as compared to current rodenticides in use.
Monitor mice populations before and after treatment by apple activity method.
Cost analysis of program as compared to current practices.

DESCRIPTION:

As above.

See also PAC - 19

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress Report Dec. 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	?	$12,500		

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

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: This study is also being funded in part by the Ministry of Agriculture and Food and the Ontario Apple Commission.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 21

BRANCH: Pesticides Advisory Committee *DATE:* July 1981

PROJECT TITLE: Evaluation of sublethal effects of permethrin, atrazine and methoxychlor on zooplankton under natural and laboratory conditions.

KEY WORDS: Pesticides Zooplankton Sublethal effects

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

LIAISON OFFICER OR SUPERVISOR Pesticides Advisory Committee

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

OBJECTIVE:

To determine sublethal effects, if any, of permethrin, atrazine and methoxychlor on zooplankton.

DESCRIPTION: Data on sublethal effects of pesticides on freshwater zooplankton are rare. However, such effects are important in the ultimate impact of a pesticide on an ecosystem and in the understanding of its modus operandi.

a) The study will compare size, biomass and fecundity of selected species of Cladocera, Copepoda and Rotifera from control corrals and from corrals treated with sublethal concentrations of permethrin, atrazine and methoxychlor.

b) assess the impact of sublethal concentrations of permethrin, atrazine and methoxychlor on growth and reproduction.

c) assess the impact of sublethal concentrations of permethrin, atrazine and methoxychlor on respiration of selected species of Cladocera and Copepoda.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$9,140	$9,140		

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

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 22

BRANCH: **Pesticides Advisory Committee** *DATE:* July 1981

PROJECT TITLE: **Development of an acceptable procedure to allow disposal of pesticide containers in sanitary landfills.**

KEY WORDS: **Pesticide containers Disposal Landfill sites**

PRINCIPLE INVESTIGATOR AND AFFILIATION **Dr. C. R. Harris, Mr. J. R. W. Miles — University of Western Ontario, London, Ont.**

LIAISON OFFICER OR SUPERVISOR **Pesticides Advisory Committee**

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

OBJECTIVE:

The overall objective of this program will be to establish that pesticide containers, when properly rinsed, will constitute no serious environmental hazard when disposed of in sanitary landfill sites.

DESCRIPTION:

Specific objectives will be to: 1) determine extent of grower use or insecticides and current disposal practices; 2) determine number and type of containers used and dispose of same; 3) determine amounts of formulated pesticide remaining in unrinsed "empty" containers; 4) determine the effectiveness of rinsing cans with one or two commercially available rinsing devices and the feasibility of adapting rinsing devices to spray equipment currently in use; 5) remove and dispose of pesticide containers discarded through the region selected for the study; and 6) determine the extent to which water and sediment in the drainage system in the study area is contaminated with pesticide residues.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	* $24,880	$12,440		

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

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: *** The Waste Management Branch of MOE is funding in the amount of $12,440.**

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 23

BRANCH: Pesticides Advisory Committee *DATE:* July 1981

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 - Department of Environmental Biology
Dr. B. V. Helson University of Guelph

LIAISON OFFICER OR SUPERVISOR 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:

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

DESCRIPTION: To maintain up-to-date information on the effectiveness of promising new insecticides, both larvicides and adulticides, for biting fly control and to assess the environmental impact under Ontario conditions.

To increase the effectiveness of mosquito control programs in Ontario.

To reduce the environmental impact of mosquito control by chemical means in Ontario.

To monitor for the development of insecticide resistance in mosquitoes so that recommendations will be effective.

To study the biology of selected mosquitoes in Ontario as a basis for improved methods and guidelines for control.

To conduct what research is necessary to develop effective methods for reducing nuisance problems with blackflies and other biting flies.

To evaluate control devices promoted for consumer use.

DURATION OF PROJECT 6 *YEARS* *PRESENT YEAR IS* 6th *YEAR* *REPORTING DATE* Progress Report Dec. 1981

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$300,000	$50,000		

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

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Evaluating this continuing study has been the responsibility of the Pesticides Advisory Committee for the past four years.

Ministry of the Environment
Ontario

PC-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* Aug./81

PROJECT TITLE:

TEMAGAMI LOW PRESSURE SEWER SYSTEM

KEY WORDS: Low Temperature, bedrock, sewer, Low-pressure, Temagami, shallow-bur.

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 2½ *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* April/82

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	52,700	25,000 (to May 1981)		

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-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control, Applied Sciences *DATE:* Aug/81

PROJECT TITLE:
FROST INDUCED SOIL LOADS

KEY WORDS: Pipelines, Watermains, Freezing, Pipe Design

PRINCIPLE INVESTIGATOR AND AFFILIATION: H.R. Foggett

LIAISON OFFICER OR SUPERVISOR: M.B. Fielding

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

OBJECTIVE:
-To measure and develop methods of predicting soil loads on pipelines as imposed by freezing conditions

DESCRIPTION:

Temperature and pressure sensors have been installed in a trench purpose-built in an area subjected to cold (but not permafrost) conditions

DURATION OF PROJECT: 3 YEARS *PRESENT YEAR IS:* 1 YEAR *REPORTING DATE:* Sept./84

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	65,000	23,000	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:
On MTC property

REMARKS:

Ministry of the Environment
Ontario

PC-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* Aug./81

PROJECT TITLE:

Multiple Individual Leaching Bed Study

KEY WORDS:
Private waste, septic tanks, tile beds, ground water

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 determine the effect on groundwater of many individual leaching beds constructed for private waste disposal on adjoining properties

DESCRIPTION:

- Groundwater quantity and quality will be measured before and after the construction of a housing development using septic tank-leaching bed waste disposal

DURATION OF PROJECT 4 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* Apr./85

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	150,000	29,000	140,000	25,000

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

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:
-

REMARKS:

Ministry of the Environment
Ontario

PC-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control, Applied Sciences Section *DATE:* Aug./81

PROJECT TITLE:
PRIVATE WASTE DISPOSAL BY SAND FILTER

KEY WORDS: Waste treatment, septic tank, filter

PRINCIPLE INVESTIGATOR AND AFFILIATION: F. Rodrigues

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* 4th *YEAR* *REPORTING DATE* ——

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	60,500	15,000	53,000	13,000

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* Sept. 10, 1981

PROJECT TITLE:

A survey of water quality in distribution systems

KEY WORDS:

PRINCIPLE INVESTIGATOR AND AFFILIATION: H.J. Graham & 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 examine drinking water distribution systems for water quality changes in various health and asethetic related parameters.

DESCRIPTION:

To examine in detail the water quality in the treatment plant and the distribution system of selected municipalities. Parameters examined will include general chemistry, micro and macro-organisms, heavy metals and asbestos. About 25 locations will be examined in each year of the project.

DURATION OF PROJECT: 2-3 YEARS *PRESENT YEAR IS:* 1 YEAR *REPORTING DATE:* Interim report late 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$35,000	$10,000	3.0	1.2

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

2 Experience '81 students plus 1 Quebec student worked on project in 1981; this level of manpower is estimated to be available in next 2 years.

Ministry of the Environment
Ontario

PC-6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* Sept. 10, 1981

PROJECT TITLE:
New potable water treatment method for trihalomethane precursor and synthetic organic removal

KEY WORDS: Organics, Coagulants, PAC, PBAC

PRINCIPLE INVESTIGATOR AND AFFILIATION Zenon Environmental Enterprises

LIAISON OFFICER OR SUPERVISOR K.J. Roberts & R.B. Hunsinger

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

OBJECTIVE:
To examine various new coagulants for the reduction of organics in potable water.

DESCRIPTION:
Jar test studies will be carried out to examine the conventional removal characteristics of coagulants such as PBAC (polymerized basic aluminum chloride) and PAC (polyaluminum chloride). Following conventional evaluation the effects on trace organic contaminants will be evaluated.

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*
	$249,000	150,000	0.25	.15

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
Health & Welfare - Canada
Dept. of Supply & Services - Canada

REMARKS:
Man years are for MOE personnel only; $ for MOE personnel not indicated.

Ministry of the Environment
Ontario

PC-7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* Sept. 10, 1981

PROJECT TITLE: The Occurrence of Yersinia Enterocolitica in Selected Raw and Treated Drinking Waters in Ontario

KEY WORDS: Yersinia Enterocolitica, Drinking Water

PRINCIPLE INVESTIGATOR AND AFFILIATION: Ann H. Vajdic

LIAISON OFFICER OR SUPERVISOR: Ann H. Vajdic

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

OBJECTIVE:

To determine the frequency of occurrence of Yersinia enterocolitica in raw and treated municipal water supplies, using P-A and M-F cultures.

DESCRIPTION:

P-A and M-F cultures, after routine analysis for coliforms and other indicator bacteria has been completed, will be examined for the presence of Yersinia enterocolitica using established isolation techniques. All Gram negative isolates will be screened biochemically for characteristics typical of Yersinia species, and final identification will be completed on the API 20E system.

Isolates identified as Yersinia enterocolitica will be forwarded to the Ministry of Health, Environmental Bacteriology laboratory for final confirmation and virulence testing

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	30,000	30,000	1.3	1.3

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-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* Sept. 10, 1981

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

KEY WORDS: Drinking waters, 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 alleviate the aggressive condition and to avoid possible problems of asbestos pick-up in the distribution system.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$25,000	$5,000	0.6	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:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* Sept. 10, 1981

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:* 3rd YEAR *REPORTING DATE:* 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$260,684.00	$24,500	0.5	0.15

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

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 indicated

Ministry of the Environment
Ontario

PC-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* Sept. 10, 1981

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* final *YEAR* *REPORTING DATE* 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	38,000		0.3	0.05

SOURCE OF FUNDS:
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING X
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. $ for MOE personnel not indicated.

Ministry of the Environment
Ontario

PC-11

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* Sept. 10, 1981

PROJECT TITLE:
Trace Organics in Potable Water Supplies

KEY WORDS: Organics, potable water

PRINCIPLE INVESTIGATOR AND AFFILIATION: G. Martin and 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* 5 —— *YEAR* *REPORTING DATE* 1981

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	150,000	35,000	5	1.0

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 contaminats in water.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

PC-12

BRANCH: Pollution Control *DATE:* Sept. 10, 1981

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:* final YEAR *REPORTING DATE:* 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$45,500	$10,500	2.0	0.3

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-13

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* Sept. 10, 1981

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 to 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. The results will have probable significance in the water industry specifications.

DURATION OF PROJECT 2.5 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* 1982

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-14

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* Sept. 10, 1981

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 optimized

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*
		$8,000		0.2

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

IS A REPORT ANTICIPATED? Yes; in house documents re each investigation

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: This is an on-going study since each new manganese control situation could present a unique treatment requirement.

Ministry of the Environment
Ontario

PC-15

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Polluton Control *DATE:* Sept. 10, 1981

PROJECT TITLE:

Iron Sequestration

KEY WORDS: Iron, 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 improve control of iron in water supplies

DESCRIPTION:

Control of iron through addition of sodium silicate may be improved in water supplies in terms of extended stability, a broadened range of treatment effectiveness, and increased chemical efficiency. A newly developed procedure for preserving the unique chemical properties of fresh natural well waters for study back at the laboratory can now be utilized.

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?

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

This on-going study takes additional advantage of actual water supply difficulties as they arise for the unique insight they can help provide.

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Ontario

PC-16

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* Sept. 10, 1981

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 finished water quality. This is essentially an on-going project which monitors asbestos levels

DURATION OF PROJECT —— *YEARS* *PRESENT YEAR IS* 8th *YEAR* *REPORTING DATE* 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$97,000	$10,000	3.0	0.3

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:* Sept. 10, 1981

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.

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

BUDGET:

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

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

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

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

This is an on-going area of study.

Ministry of the Environment
Ontario

PC-18

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* Sept. 10, 1981

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

OBJECTIVE:

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

To study the use of ozone for colour removal in iron- and manganese-bearing 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 also.

Ozone treatment will be evaluated for the effectiveness in reducing colour levels in manganese-laden waters.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$10,000	$2,000	0.85	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: Interim report available

Ministry of the Environment
Ontario

PC-19

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* Sept. 10, 1981

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 their relative toxicity and potential health effects

DESCRIPTION:

Study will examine differing raw waters (turbidity, coloured, Great Lakes) and the by-products produced by the various processes of ozonation, ozonation/chlorination. By-products will be analyzed and evaluated for their health effects.

Study will attempt to establish design criteria for the use of ozone in water treatment in order to minimize formation of chlorinated organics in drinking water.

DURATION OF PROJECT: 3 YEARS *PRESENT YEAR IS:* 3rd YEAR *REPORTING DATE:* mid 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$214,680	$90,000		0.1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING X
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
Man years are MOE Personnel

Ministry of the Environment
Ontario

PC-20

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* Sept. 10, 1981

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 1.0 *YEARS* *PRESENT YEAR IS* final *YEAR* *REPORTING DATE* 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$17,000	$2,000	0.80	0.05

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:
Report in process of being prepared.

Ministry of the Environment
Ontario

PC-21

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* August, 1981

PROJECT TITLE:
Formation Of Chlorinated Organics During Disinfection Of Secondary Effluent.

KEY WORDS:
Chlorinated Organics, Chlorine Disinfection, Wastewater Effluent.

PRINCIPLE INVESTIGATOR AND AFFILIATION H. Kronis, MOE.

LIAISON OFFICER OR SUPERVISOR K. W. A. Ho, MOE.

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

OBJECTIVE:
To examine the factors that influence the formation of chlorinated organics during the disinfection of secondary effluent, and hence, develop effective means to reduce their formation.

DESCRIPTION:
The study is being carried out in a full scale WPCP in Southern Ontario to closely examine the effect of varying three key parameters on the nature and quantity of chlorinated organics formation. The three parameters are:

(1) Chlorine concentration in the concentrate stream (500 mg/L and 1,700 mg/L as Cl_2).
(2) Chlorine concentrate contact time (2 and 5 minutes).
(3) Undisinfected effluent quality.

Feasibility to reduce chlorinated organics formation by direct gaseous chlorination will also be evaluated. All chlorinated effluent samples will be disinfected with either the concentrate or gaseous chlorine to a constant dosage of 10 mg/L and 30 minutes contact time. Formation of chlorinated organics in the concentrate stream and in the chlorinated samples will be monitored by GC and total organic halogen "tox" analyses.

DURATION OF PROJECT 2.5 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* April, 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$15K		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:
The study was supported by the MOE, Organics Trace Contaminants Section for initial GC/MS identification analysis.

Ministry of the Environment
Ontario

PC-22

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: August, 1981

PROJECT TITLE:
Arsenic Waste Treatability Study - Deloro

KEY WORDS:
Arsenic, Leachate, Physical/Chemical Treatment

PRINCIPLE INVESTIGATOR AND AFFILIATION H. Kronis, MOE.

LIAISON OFFICER OR SUPERVISOR K. W. A. Ho, MOE., C. Ramshaw, Southeastern Region, MOE.

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

OBJECTIVE:
To establish process parameters: chemical dosages, process equipment configurations and sizes; for a full scale treatment facility that would consistently achieve 5 mg/L or less total arsenic in the treated leachate in Deloro.

DESCRIPTION:
Jar tests and continuous flow pilot plant testing program were conducted to collect the following data:

(1) Ferric chloride, lime and polyelectrolyte dosages required for achieving the desired arsenic residual and for optimum sludge settling rate.
(2) Preferred equipment type and configuration.
(3) Equipment sizes.
(4) Sludge dewaterability and stability.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* April, 1982

BUDGET:

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

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
Southeastern Region, MOE.

REMARKS:
This treatability study is a small part of an overall scheme to provide efficient arsenic removal in the leachate collected at Deloro, in 1982.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

PC-23

BRANCH: Pollution Control

DATE: August, 1981

PROJECT TITLE:

Screening For Priority Organic Contaminants And Heavy Metals In Digested Municipal Sludges.

KEY WORDS:

Priority Organic Contaminants, Heavy Metals, Digested Sludges.

PRINCIPLE INVESTIGATOR AND AFFILIATION K. W. A. Ho, MOE.

LIAISON OFFICER OR SUPERVISOR G. Zukovs, MOE.

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

OBJECTIVE:

To examine and compare the nature and quantity of volatile, and semi-volatile organic contaminants and heavy metals present in aerobically and anaerobically digested WPCP sludges.

DESCRIPTION:

Digested sludges were collected from five municipal WPCP's, each on three separate occassions. The samples will be analysed by GC/MS for organic contaminants, in addition to analyses for heavy metals and conventional quality parameters.

The results will be used to determine if the occurrance of organic contaminants can be related to sludge treatment process, and process conditions, and to the occurrence of heavy metals.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* March, 1982

BUDGET:	*TOTAL DOLLARS*		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$1K		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:

Air Pollution Control Directorate, Environment Canada.

REMARKS:

GC/MS analyses were conducted by the Organic Method Development Section, Air Pollution Control Directorate, Environment Canada, In Ottawa.

Ministry of the Environment
Ontario

PC-24

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* August, 1981

PROJECT TITLE:

UV Disinfection Of Secondary Effluent

KEY WORDS:
UV, Disinfection, Secondary Effluent

PRINCIPLE INVESTIGATOR AND AFFILIATION Peter Bohm, MOE.

LIAISON OFFICER OR SUPERVISOR K. W. A. Ho, MOE.

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 secondary effluent in an Ontario WPCP.

DESCRIPTION:

The study evaluated the performance of a pilot scale, proprietary UV disinfection unit in a typical Southern Ontario WPCP (Richmond Hill). The relationship between UV intensity, exposure time, effluent physical chemical quality and disinfection efficiency were investigated and reported.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* March, 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$2K			

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

The study was supported by the Region of York in supplying the WPCP facilities and by the Water Refining Inc., in loaning the UV disinfection unit.

Ministry of the Environment
Ontario

PC-25

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: August, 1981

PROJECT TITLE:

Fate Of Trace Organics In A Wastewater Treatment Plant.

KEY WORDS:
Toxic Organics, Secondary Treatment, Sludge, Wastewater Treatment.

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

LIAISON OFFICER OR SUPERVISOR G. Zukovs, MOE - T. Bridle, DOE.

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

OBJECTIVE:
Determine the fate of six Selected Priority Trace Organic Pollutants in their passage through a conventional activated sludge sewage system including anaerobic digestion.

DESCRIPTION:
The study can be divided into three major areas:

(1) An extensive literature review and discussion of extraction methods available for measuring Trace Organic Contaminants in Sludge Samples, and the removability of organic contaminants during WPCP treatment processes.
(2) Identification of the nature and occurrence of specific trace organic contaminants in liquid sewage and sludge samples collected in a Southern Ontario WPCP.
(3) A detailed investigation of the EPA "Liquid-Liquid" extraction protocol with methylene dichloride, and the removability of six selected trace organic contaminants in their passage through two independently operated aerobic sewage treatment reactors and an anaerobic sludge digester.

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

BUDGET:	*TOTAL DOLLARS*		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$30K		1/2	

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

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-26

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: August, 1981

PROJECT TITLE:
Evaluation Of Field Test Kits.

KEY WORDS:
Field Test Kits.

PRINCIPLE INVESTIGATOR AND AFFILIATION D. Woodside, MOE.

LIAISON OFFICER OR SUPERVISOR K. W. A. No, MOE.

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

OBJECTIVE:
To determine the accuracy and applicability of several field test kits designed for measuring total phosphorus, ammonia and nitrate concentrations in sewage effluents.

DESCRIPTION:
The accuracy and applicability of several field test kits will be tested against final effluents collected in eight municipal WPCP's and against user's laboratory experience.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* October, 1982

BUDGET:

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

RESEARCH AND DEVELOPMENT INVENTORY

PC-27

BRANCH: Pollution Control

DATE: August, 1981.

PROJECT TITLE:

The Applicability Of UV Disinfection Technology In Ontario Wastewater Treatment Plants.

KEY WORDS:

UV Disinfection, Municipal Wastewater Treatment Plants.

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. L. W. MacPherson, Standard Biological Laboratories.

LIAISON OFFICER OR SUPERVISOR K. W. A. Ho, MOE.

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

OBJECTIVE:

- To determine the applicability and design requirements for UV disinfection technology in Ontario, tertiary and secondary WPCP's;
- To investigate the significance of photo-reactivation of bacterial organisms in UV disinfected effluents.

DESCRIPTION:

- The study will be carried out in eight different tertiary and secondary municipal WPCP's. To assist design requirements for UV disinfection technology, UV dosages required to achieve target levels of coliform indicators and two selected pathogenic bacteria will be determined in relationship to effluent quality. The significance of photo-reactivation of coliforms indicators will be assessed against the photo-reactivation of pathogenic bacteria and disinfection condition provided initially.

DURATION OF PROJECT	*PRESENT YEAR IS*	*REPORTING DATE*
1 YEARS	1 YEAR	October, 1982

BUDGET:	*TOTAL DOLLARS*		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$42K		3	

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

The funding for this study is provided by the Provincial Lottery Fund.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

PC-28

BRANCH: Pollution Control

DATE: September, 1981

PROJECT TITLE:

High Level Phosphorus Removal from Secondary Effluents

KEY WORDS:
Phosphorus, effluent filtration, chemical addition.

PRINCIPLE INVESTIGATOR AND AFFILIATION Gore & Storrie Consulting Engineers (Barrie), Ainley & Associates Consulting Engineers (Orillia).

LIAISON OFFICER OR SUPERVISOR S. A. Black

RESEARCH CATEGORY:

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

OBJECTIVE:

To assess the feasibility of reducing effluent phosphorus concentrations at the Barrie and Orillia WPCP's to less than 0.3 mg/L total phosphorus and to evaluate the advantages of dual point chemical addition.

DESCRIPTION:

The studies at the two plants involves the optimization of current plant operations to determine phosphorus removal capabilities of existing processes followed by the evaluation of a pilot effluent filter with and without chemical addition to the filter.

DURATION OF PROJECT 1 *YEARS* — *PRESENT YEAR IS* 1st *YEAR* — *REPORTING DATE* December, 1981.

BUDGET:

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

SOURCE OF FUNDS:

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

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

PC-29

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: September, 1981

PROJECT TITLE:
An investigation of the Bio-Availability Phosphorus (BAP) In Municipal Wastewaters.

KEY WORDS:
Phosphorus, Bio-Availability, Chemical Addition, Effluent Filtration.

PRINCIPLE INVESTIGATOR AND AFFILIATION Canviro Consultants Limited

LIAISON OFFICER OR SUPERVISOR S. A. Black

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

OBJECTIVE:

To determine the effect of various municipal wastewater treatment processes upon the bio-availability of phosphorus in municipal wastewaters.

DESCRIPTION:

The investigation is divided into two primary phases with Phase 1 assessing the BAP within a typical secondary sewage treatment plant under controlled operating conditions and Phase II comparing the BAP of 12 municipal WPCP's which utilize various organic and phosphorus removal technologies.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* June, 1982.

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$336,000			

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

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:

Wastewater Technology Centre and D.S.S.

REMARKS:

Ministry of the Environment
Ontario

PC-30

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control Branch, Water Resources Branch *DATE:* September, 1981

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.

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.

A parallel computer modelling study will extend observed data and assist in generalizing the results.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 3 *YEAR* *REPORTING DATE* 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$380,000	$70,000		

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-31

BRANCH: Pollution Control (Rideau River Stormwater Mge Study) *DATE:* September, 1981.

PROJECT TITLE:
Effects of Street Sweeping On Controlling Urban Runoff Bacteria Populations.

KEY WORDS: Street Sweeping, Bacteria.

PRINCIPLE INVESTIGATOR AND AFFILIATION Robert Pitt, Environmental Consulting Engineer.

LIAISON OFFICER OR SUPERVISOR G. Zukovs & H. Loijens.

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

OBJECTIVE:
To assess the effectiveness of street sweeping operations in controlling bacteriological populations in urban runoff.

DESCRIPTION:
A limited sampling program of bacteria in street dust and dirt will be used to support an evaluation of street sweeping for control of bacteria in urban runoff.

DURATION OF PROJECT	*PRESENT YEAR IS*	*REPORTING DATE*
0.5 *YEARS*	1 *YEAR*	December, 1981.

BUDGET:	*TOTAL DOLLARS*		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$10K	$10K	$10K	0.5	0.5

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

PC-32

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* August 26, 1981

PROJECT TITLE:
Full-Scale Anaerobic Digester Mixing Optimization And Loading Studies.

KEY WORDS:
Digester, Anaerobic, Mixing, Loading.

PRINCIPLE INVESTIGATOR AND AFFILIATION I.E.C. Limited (Dr. Keith Murphy)

LIAISON OFFICER OR SUPERVISOR R. K. Khettry

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

OBJECTIVE:

1. To achieve optimization of mixing performance in a full-scale anaerobic digester at the Brantford WPCP, with minimization or elimination of dead space and substrate short circuit.

2. To establish upper organic and hydraulic loadings possible in the presence of optimum mixing.

DESCRIPTION:

A twenty-four month study to achieve digester mixing optimization and establish upper loading levels possible under this condition will be conducted at the Brantford WPCP. For the purpose, in addition to the three gas mixers installed in the test unit, five will be added as will additional gas blower capacity. To allow incremental energy applications to determine where satisfactory mixing is achieved. In the presence of good mixing as indicated by tracer washout studies, organic and hydraulic loadings to the test unit will be increased to levels hitherto unacceptable on full-scale in an attempt to illustrate the relationship between good mixing, loadings, and gas production associated with higher loadings.

DURATION OF PROJECT 3 ——— *YEARS* *PRESENT YEAR IS* 1st ——— *YEAR* *REPORTING DATE* Spring 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$246,000	$125,000		

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
Ministry of Energy/C.C.I.W.

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: August 25, 1981

PROJECT TITLE:
To Investigate The Costs And Maintenance Required To Operate A Full Scale Chlorination-Dechlorination System.

KEY WORDS:
Chlorination-Dechlorination.

PRINCIPLE INVESTIGATOR AND AFFILIATION Tom Brankovic

LIAISON OFFICER OR SUPERVISOR K. W. A. Ho

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

OBJECTIVE:
To Determine:
(1) The capital and operating costs of a full scale chlorination-dechlorination system;
(2) The maintenance and reliability of such system;
(3) Feasibility to further optimize the operation of a chlorination-dechlorination system in order to reduce its overall costs.

DESCRIPTION:
Many WPCP's will be required to dechlorinate their final effluents before discharge, in order to continually protect public health and water quality concurrently. Hence, a thorough understanding of the costs and operating experience associated with a full scale chlorination-dechlorination system is important to future installations. The study is being carried out in Milton WPCP which is presently the only WPCP employs such system in Ontario. The operator's experience, maintenance records, the capital and operating costs accured by this system will be analysed and reported.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* March 31, 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$5,000	$5,000	60 man days	60 man days

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
Participated by the Region of Halton.

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* August 25/81

PROJECT TITLE:
To Determine The Average Unit Process Operating Costs In Several WPCP's.

KEY WORDS:
Operating costs for WPCP unit processes.

PRINCIPLE INVESTIGATOR AND AFFILIATION Tom Brankovic

LIAISON OFFICER OR SUPERVISOR R. K. Khettry

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

OBJECTIVE:
To determined the operation and maintenance time and costs associated with individual unit processes in a typical WPCP.

DESCRIPTION:
The operator's time and maintenance costs required to run the individual treatment processes in a typical WPCP were obtained from twenty-five southern Ontario WPCP's.

This information will assist the consultant and municipal engineers to optimize future WPCP design and operation.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* March 31, 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$5,000	$5,000	60 man days	60 man days

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
Participated by the Regions of Halton, York and Durham.

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control

DATE: August 25, 1981

PROJECT TITLE:
Nitrification-Denitrification For The Control Of Ammonia And Hydrogen Sulfide In Lagoon Effluents.

KEY WORDS:
Extended aeration, no sludge wasting, nitrification, denitrification, lagoons.

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:

1. To establish design and operating criteria for a simplified (no sludge wasting) nitrifying extended aeration system to be used as a pre-treatment unit ahead of lagoons during winter operation.
2. To determine if the nitrate concentrations produced are adequate to prevent hydrogen sulfide accumulation in the lagoon contents.

DESCRIPTION:

An existing extended aeration activated sludge plant followed by a polishing lagoon will be converted to a "no sludge wasting" system and monitored extensively during the winter of 1981-1982.

DURATION OF PROJECT 2 *YEARS* — *PRESENT YEAR IS* 1st *YEAR* — *REPORTING DATE* Fall 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	3,000	1,500	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:

No

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* August 25, 1981

PROJECT TITLE:
Nitrification And Denitrification Of Sewage Treatment Plant Effluent.

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

PRINCIPLE INVESTIGATOR AND AFFILIATION K. W. A. Ho

LIAISON OFFICER OR SUPERVISOR R. K. Khettry

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

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

DURATION OF PROJECT 5 *YEARS* *PRESENT YEAR IS* 5 *YEAR* *REPORTING DATE* December 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$20,000.00	$1,000.00	1.50	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:* August 25, 1981

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 a 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 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* December 1981.

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$15,000.00	$1,000.00	0.5	0.05

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: August 1981.

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. K. 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+NH_3) ratios for satisfactory land disposal of digested sludges.

DESCRIPTION:
Several aerobic digesters and aerated holding tanks have been monitored to show nitrogen conversion pathways. Particular emphasis has been 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 has been investigated.

DURATION OF PROJECT 3 *YEARS* — *PRESENT YEAR IS* —— *YEAR* — *REPORTING DATE* December 1981.

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$10,000.00		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: August 1981

PROJECT TITLE:
Aerated Lagoon Evaluation

KEY WORDS: Aerated Lagoon, Design, Operation.

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 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 five aerated lagoon system installations in the Province. Factors such as: treatment efficiency, aeration capacity, mixing capabilities, etc., have been determined and evaluated.

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

BUDGET:

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

PC-40

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Pollution Control *DATE:* August 25, 1981

PROJECT TITLE: Nitrification-Denitrification For The Control Of Ammonia And Hydrogen Sulfide In Lagoon Effluents.

KEY WORDS: Extended aeration, no sludge wasting, nitrification, denitrification, lagoons.

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:

1. To establish design and operating criteria for a simplified (no sludge wasting) nitrifying extended aeration system as a pre-treatment unit ahead of lagoons during winter operation.
2. To determine if the nitrate concentration produced are adequate and to prevent hydrogen sulfide accumulation in the lagoon contents.

DESCRIPTION:

A full scale nitrification study will be carried out at the Brampton, O.E.F. during the winter of 1981-1982 at varying aeration detention times and temperatures. No sludge wasting will be practiced. Main emphasis will be placed on ammonia conversion to nitrate. Monitored will be in and effluent BOD_5, SS, NH_3-N, TKN, NO_2, NO_3, pH, alkalinity, SO_4. In addition mixed liquor SS, VSS, DO, Temp. SVI, RR will be recorded. For denitrification, a clarifier will be used. Nitrified effluent will be fed continuously at a rate corresponding to six months detention. Clarifier effluent quality will be monitored as above. In addition, sulfide concentration will be monitored.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Fall 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	2,000	1,000	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:

No

REMARKS:

Ministry of the Environment
Ontario

PL-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources, POLLUTION CONTROL *DATE* April 1981

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

KEY WORDS: Listowel, Marsh, Experimental Marsh, Heavy Metals, Nutrients, Bacterial Contamination, Bulrushes, Harvesting Bulrushes

PRINCIPLE INVESTIGATOR AND AFFILIATION Gore and Storrie Ltd.
M. Palmer. I. Wile, Water Resources Branch

LIAISON OFFICER OR SUPERVISOR S. A. Black, Pollution Control Branch

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	*PRESENT YEAR IS*	*REPORTING DATE*
3 *YEARS*	3rd *YEAR*	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	$18,000	See below for Partners	

SOURCE OF FUNDS:	*REGULAR WORK PROGRAM*	*SPECIAL MINISTRY FUNDING*	*JOINTLY FUNDED PROJECT*	*OTHER*
	X	—	X	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-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* April 1981

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, West Central Region

RESEARCH CATEGORY: *INTERNAL* Partly *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.

This project was originally funded for two years and increased to three years in 1980.

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*
	$516,300	$98,800	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: Funded 50/50 by Health & Welfare Canada and Ministry of the Environment. This project is continued in its fourth year by the Ontario Ministry of Health and H. & W. Canada

REMARKS:

Provincial Lottery - Project 78-020-33
Funded 50/50 by Health & Welfare Canada and Ministry of the Environment

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT *DATE:* April 1981

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, Garbage Gas

PRINCIPLE INVESTIGATOR AND AFFILIATION: Hydrology Consultants Ltd.
1125 Dundas Street East, Mississauga, Ontario

LIAISON OFFICER OR SUPERVISOR: J. Petoia, Waste Management Branch

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

OBJECTIVE: To provide the Ministry of the Environment with information on patterns of gas production and migration at completed and active sanitary landfills and dumps as this relates to site after use and impacts on the use of adjacent lands.

DESCRIPTION: The Project will entail review and assessment of the state of the art of gas production and migration at selected closed sanitary and industrial waste landfill sites. Special testing will be required. Test areas selected will be based on composition, type and volume of waste and type and method of placement. Production and migration patterns of gases, resulting from man-made and natural processes and restrictions will also be investigated.

ANTICIPATED RESULTS:

- Development of a comprehensive state-of-the-art document on landfill gas production and migration and its control.
- Documentation of landfill gas production, migration problems and possible solution to problems in Ontario.
- Development of a data base describing gas production and migration of selected landfill sites in Ontario.
- Quantification of problems real or alleged that relate to landfill gas production and migration.
- Development of criteria that may be adopted as guidelines for use by the Ministry of the Environment regulating completed sanitary landfills.

DURATION OF PROJECT: 3 *YEARS* *PRESENT YEAR IS:* 3rd *YEAR* *REPORTING DATE:* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$287,500	$78,900	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

PARTICIPATION BY OTHER MINISTRIES: None

REMARKS: The information will be beneficial for the determination and selection of future uses of waste disposal areas. It will provide for efficient use of hitherto, unuseable land, which, due to urban development; now occupies prime areas. Results of the study are expected to aid thorough assessment of the necessary requirements for safely incorporating structures on or adjacent to completed solid waste disposal sites.

Provincial Lottery Project 78-023-13

Ministry of the Environment
Ontario

PL-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* April 1981

PROJECT TITLE: Ozone Application as an Alternative to Chlorine for Drinking Water Disinfection

KEY WORDS: Ozone, Drinking Water, Disinfection, Chlorine, Organics

PRINCIPLE INVESTIGATOR AND AFFILIATION: International Environmental Consultants Ltd.
D. G. Langley, K. L. Murphy

LIAISON OFFICER OR SUPERVISOR: A. Oda , Pollution Control Branch

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:* 3rd *YEAR* *REPORTING DATE:* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$214,680	$89,900	None from MOE	

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS: A detailed report will be submitted upon completion of the research which will include cost estimates for add-on ozonation. Operating guidelines for ozone application as an alternative to chlorine disinfection of drinking water will be presented. Information on reduction of potential mutagenic and carcinogenic compounds in drinking water in Ontario should result from this Project.

Provincial Lottery Project 79-027-13

Ministry of the Environment
Ontario

PL-5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* April 1981

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, Disinfection

PRINCIPLE INVESTIGATOR AND AFFILIATION Beak Consultants Ltd.
S.L. Hodd

LIAISON OFFICER OR SUPERVISOR A. Vajdic, Pollution Control Branch

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* X
MULTI-YEAR PROJECT X *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* 3rd *YEAR* *REPORTING DATE* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$260,684	$14,100	None from MOE	

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: 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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WATER RESOURCES *DATE:* April 1981

PROJECT TITLE: Biomonitoring of Public Water Supplies

KEY WORDS: Biomonitoring, Organics, Fish, Toxicity, Public Water Supplies, Drinking Water,

PRINCIPLE INVESTIGATOR AND AFFILIATION: International Environmental Consultants Ltd.
T. W. Beak, D. G. Langley

LIAISON OFFICER OR SUPERVISOR: G. R. Craig, Water Resources Branch

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$214,427	$21,700	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:

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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES *DATE:* April 1981

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, Laboratory Services Branch

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* 3rd *YEAR* *REPORTING DATE* 1982

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$200,000	$47,300	None from MOE	

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Provincial Lottery Project 79-031-12

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* April 1981

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 D. Corr, Air Resources Branch

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 3 *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* 1981

BUDGET: MOE Share of Total is $177,000 FY 80/81 = $134,000
TOTAL DOLLARS *TOTAL PROJECT* $452,000 for all Partners *CURRENT YEAR* for MOE $43,000
MAN YEARS *TOTAL PROJECT* None from MOE *CURRENT YEAR*

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: 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 1981

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, Trace Contaminants

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* — — *SOLICITED CONTRACT* — — *MULTI-YEAR PROJECT* X — *CONCURRENT PROJECT* —

OBJECTIVE: The first aim is to provide estimates of tissue cadmium and lead levels that can be considered "normal" at this time for the various age-sex groups. This information is not available at present for Canadian populations. It is considered of importance since these data will serve as a baseline for future biological monitoring of cadmium in kidney and of lead in bone. Secondly, the project aims to assess how far individuals, who are occupationally or environmentally exposed to cadmium or lead, have elevated tissue metal levels relative to the above-mentioned normal levels. Thirdly, the data may lead to an estimate of the maximum lead and cadmium levels in selected human tissues (bone and kidney, respectively) at which there is no evidence of an abnormal cause-of-death pattern.

DESCRIPTION:

The project aims to estimate the levels of cadmium, zinc and lead in two human tissues (kidney and bone), and to provide an indication of which occupational and environmental factors are associated with the cadmium and lead levels in these tissues. The factors to be investigated are the occupation and place of residence, as well as the sex and age of the tissue donor, the lifetime smoking habit, and the cause of death.

DURATION OF PROJECT: 3 YEARS *PRESENT YEAR IS:* 3rd YEAR *REPORTING DATE:* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$99,000	$39,000	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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* April 1981

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 A. Szakolcai, Air Resources Branch

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* 3rd -- *YEAR* *REPORTING DATE* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$152,000	$53,400	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-11

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL, WATER RESOURCES *DATE:* April 1981

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, Combined Sewer Pollution

PRINCIPLE INVESTIGATOR AND AFFILIATION Regional Municipality of Ottawa, Carleton

LIAISON OFFICER OR SUPERVISOR D. G. Weatherbe, Water Resources Branch

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *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* 3rd *YEAR* *REPORTING DATE* 1983

BUDGET: M.O.E.'s share is $700,000

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$1,434,000	$68,000 from Lottery Funds		None from M.O.E.

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: 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

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES *DATE:* April 1, 1981

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: O. Meresz, Laboratory Services Branch

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* 2nd *YEAR* *REPORTING DATE* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$78,779	$39,100	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.

PARTICIPATION BY OTHER MINISTRIES: None.

REMARKS:

Provincial Lottery Project 79-039-32
Project started April 1, 1980.

Ministry of the Environment
Ontario

PL-13

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* April 1981

PROJECT TITLE:

Assessment of Human Exposure to Air Pollution

KEY WORDS: Air Pollution, Human Exposure, Indoor-Outdoor Pollution, Personal Monitors

PRINCIPLE INVESTIGATOR AND AFFILIATION: Frances Silverman, Ph.D., Sheldon Mintz, M.D. The Gage Research Institute, Department of Medicine, University of Toronto

LIAISON OFFICER OR SUPERVISOR: Denis Corr, Air Resources Branch

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

OBJECTIVE:

1. to calibrate and validate personal, indoor and outdoor monitors to assess human exposure to air pollution (particulates, sulphur dioxide and nitrogen dioxide).
2. to use these monitors in the field to assess human exposure to particles, SO_2 and NO_2.
3. to provide data from these studies on the relationships between these modes of measuring exposure to air pollution and assess which gives the most realistic estimate of exposure.

DESCRIPTION:

Studies of health effects of air pollution are critically dependent upon quantitation of amount of pollutant exposure. Unfortunately, there are major differences between air pollution levels measured at fixed air pollution monitoring stations, and inside and outside buildings at a distance from these stations; persons going about their activities encounter yet different amounts of pollutants. To investigate these relationships, a small portable monitor has been developed which (with minor design changes) can measure SO_2, NO_2 and particulates in all of these circumstances. A study of the health effects of these pollutants on 90 asthmatics and non-asthmatics will be undertaken.

An awareness of the relationships between personal and fixed station air pollution levels will allow rational air pollutant quality control criteria to be formulated. Furthermore, the use of personal monitors may allow identification of significant sources of air pollution within the home, a factor which is important in air pollution abatement programs.

DURATION OF PROJECT: 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$99,500	$36,700	None from M.O.E.	

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: Provincial Lottery Trust Fund pays 35.5% ($61,735) of the total cost of this Project which is $173,470. The other partners paying 64.5% of the total cost is H. & W. Canada.

REMARKS: This project was bridge funded with Lottery Funds between October 1, 1979 and March 31, 1980. Support for the project was renewed for an additional two years between June 1, 1980 and May 31, 1982.

Provincial Lottery Project 79-040-31.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* April 1, 1981

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: D. Wilson, Pollution Control Branch

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* 1984

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$237,500	$47,500	None from M.O.E.	

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:

O.M.A.F. funded the project alone in FY 80/81.

Provincial Lottery Project 79-042-33.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: NORTHEASTERN REGION

DATE: April 1981

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, Air Resources Branch

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* 2nd *YEAR* — *REPORTING DATE* March 1982

BUDGET:	*TOTAL DOLLARS*		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$89,657	$47,100	None from MOE	

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Provincial Lottery Project 79-043-32.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WATER RESOURCES *DATE:* April 1981

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* X

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* 2nd *YEAR* — *REPORTING DATE:* March 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$116,000	$43,000	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 79-044-33.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES *DATE:* APRIL 1981

PROJECT TITLE: The Continuation of Funding for the Virology Component of the University of Toronto Epidemiology Study of Bathing Beaches and Recreational Waters.

KEY WORDS: Bathing Beaches, Recreational Waters, Virology, University of Toronto, Epidemiology Study

PRINCIPLE INVESTIGATOR AND AFFILIATION: University of Toronto, Department of Microbiology and Parasitology, FitzGerald Building, Toronto, Ontario, Attn: Patricia L. Seyfried

LIAISON OFFICER OR SUPERVISOR: D. Rokosh, Laboratory Services Branch

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

OBJECTIVE: The University of Toronto was funded in FY 79/80 and 80/81 by the Federal Department of National Health and Welfare, to conduct an epidemiological study of bathing beaches and recreational waters. The study was to assess the incidence of human illness in relation to types and numbers of pathogenic organisms in bathing waters. A major component of this study involves the examination of sewage treatment plant influents, effluents, and impacted bathing waters for the presence of enteric viruses.

DESCRIPTION: The above study was funded for two years, and is to be completed by March 31, 1981. The funds needed to perform other microbiological testing and to complete the survey of bathers was under-estimated and Provincial Lottery Funds have been supplied to the University of Toronto to complete the virological portion of this investigation.

Selected beaches on the Great Lakes and recreational waters will be sampled and analyzed for enteric viruses. Effluents from sewage treatment plants impacting on these areas will also be sampled and analyzed. Results will be assimilated with bacteriological and epidemiological data obtained by the University of Toronto. This study is of vital importance to the Ministry of the Environment in assessing the risks posed by waterborne viruses in bathing beaches and recreational waters.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$17,000	$17,000	None from M.O.E.	

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:

Health and Welfare - Canada

REMARKS: The laboratory work for this project was conducted at the Ministry of the Environment Laboratory Services Branch, Resources Road Laboratory, Rexdale, Toronto, Ontario.

Provincial Lottery Project 80-045-11.

Ministry of the Environment
Ontario

PL-18

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* APRIL 1981

PROJECT TITLE: Compilation of a Summation Report on Nine Years of Research Studies on the Disposal of Sewage Sludge on Agricultural Land.

KEY WORDS: Sewage Sludge, Agricultural Land, Canada/Ontario Agreement on Great Lakes Water Quality, Disposal of Sewage Sludge

PRINCIPLE INVESTIGATOR AND AFFILIATION T. E. Bates, University of Guelph, Ontario Agricultural College, Department of Land Resource Science, Guelph, Ontario N1G 2W1

LIAISON OFFICER OR SUPERVISOR S. A. Black, Pollution Control

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

OBJECTIVE:

To summarize and publish the results of nine years of field, greenhouse and laboratory studies on the use of sewage sludge on agricultural land funded by the Canada/Ontario Agreement on Great Lakes Water Quality and M.O.E.

A Summation Report will be prepared covering all previous years of the study, showing average effects and trends over time and interpreting the data with particular emphasis on metal availability over the years.

DESCRIPTION:

The nine years of research on the subject Disposal of Sewage Sludge on Agricultural Land have been documented by reports as follows:-

Volumes 1 to V1 were funded by the Canada/Ontario Agreement on Great Lakes Water Quality. Volumes V11 to 1X were funded by the M.O.E. Provincial Lottery Funds. This grant of $11,500 to the University of Guelph is to combine Volume 1 to 1X reports into one Summation Report.

Annual reports have been prepared and printed on this work and a number of scientific papers have been published. However, a comprehensive summary of this work is required and is best done in 1980/81 when the field work is completed.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$11,500	$11,500	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

PARTICIPATION BY OTHER MINISTRIES:

No

REMARKS: The compilation of this Summation Report will conclude this research work at the University of Guelph as far as the Canada/Ontario Agreement on Great Lakes Water Quality and Provincial Lottery are presently concerned. This research work has provided valuable background information for the Ministry of the Environment Guidelines for Sewage Sludge Disposal on Land.

Provincial Lottery Project 80-046-11.

Ministry of the Environment
Ontario

PL-19

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* APRIL 1981

PROJECT TITLE: Investigation of Sleep Disturbance Effects of Road Traffic Noise

KEY WORDS: Noise, Sleep Disturbance, Traffic Noise, Road Traffic Noise

PRINCIPLE INVESTIGATOR AND AFFILIATION S. S. Wilson, S. S. Wilson and Associates, 177 Finch Avenue West, Suite 23, Downsview, Toronto, Ontario M3J 2E9

LIAISON OFFICER OR SUPERVISOR J. Manuel, Pollution Control Branch

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

OBJECTIVE:

The determination of relationship between road traffic noise levels and sleep disturbance with a view to providing recommended road traffic noise level limits in relation to perceived health effects.

The comparative analysis of objective measurements of sleep disturbance and existing subjective data on annoyance levels due to traffic noise to determine whether or not a direct correlation exists. These results can be used to determine if acceptable indoor noise levels due to road traffic can be directly related to subjective studies.

The provision of further data as to the possible relationship between total daily noise exposure and subsequent sleep effects.

DESCRIPTION:

The study will entail a program of objective measurements of sleep disturbance by road traffic noise in a real life situation coupled with a review of the literature existing on subjective studies on human response to noise. The objective/subjective data will be analysed and assessed for correlation.

Noise level limits will be recommended for indoor living environments based upon possible health impairment effects due to sleep disturbance.

The study will also provide further data on the relationship between actual measurements and subjective data acquired by interviews and between total daily noise exposure and subsequent sleep effects.

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
	$153,000	$60,526	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

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

The study will provide recommended outdoor noise level limits for living areas in residences to be built in new developments adjacent to sources of traffic noise (highways, collector roads, arterial roads, etc.). These recommended limits will be based on the relationship between road traffic noise and sleep disturbance as determined from actual measurements on subjects in their normal sleeping environment.

Provincial Lottery Project 80-047-32.

Ministry of the Environment
Ontario

PL-20

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WATER RESOURCES *DATE:* APRIL 1981

PROJECT TITLE: Review of Literature and Biological Testing Protocol Required for Multiple Toxicity Evaluation Pertaining to Hazardous Organic Compounds.

KEY WORDS: Aquatic Toxicity, Organics in Water, Lakehead University, Industrial Wastes, Fish, Toxicity, Biological Testing, Hazardous Compounds

PRINCIPLE INVESTIGATOR AND AFFILIATION G. W. Ozburn, Lakehead University, Thunder Bay, Ontario P7B 5E1

LIAISON OFFICER OR SUPERVISOR G. R. Craig, Water Resources Branch

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

OBJECTIVE:

This is a project to enable the laboratory at Lakehead University to make preparations for the start up in Fiscal Year 81/82 of Provincial Lottery Project No. 49, "Aquatic Toxicity Studies of Multiple Organic Compounds".

DESCRIPTION:

Since the priority list of hazardous chemicals is extensive it is important at the commencement of Project No. 49 to have already established the groups of chemicals that will be investigated. A portion of Project No. 48 will be devoted to a literature review of all information available on the chemicals. The search will also include all known testing protocol with respect to biological systems and the parameters for handling each group of chemicals.

During this project, the background information on the hazardous chemical groups will be reviewed at regular intervals by the Project Steering Committee headed by G. Craig. Some of the expenses of Proposal 159 is used to pay travelling expenses for some of the Steering Committee members.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$10,900	$10,900	None from M.O.E.	

SOURCE OF FUNDS: Provincial Lottery Funds and M.O.E. Hazardous Contaminants Co-ordinator *REGULAR WORK* —— *SPECIAL MINISTRY FUNDING* X *JOINTLY FUNDED* X *OTHER PROJECT* X All funds from M.O.E.

IS A REPORT ANTICIPATED?

Yes, in conjunction with and as a part of Project No. 49

PARTICIPATION BY OTHER MINISTRIES:

None

REMARKS: This Project, (No. 48), is of three months duration to supply bridge funding to Project No. 49 which started April 1, 1981.

Provincial Lottery Project No. 80-048-31

Ministry of the Environment
Ontario

PL-21

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WATER RESOURCES *DATE:* APRIL 1981

PROJECT TITLE: Aquatic Toxicity Studies of Multiple Organic Compounds

KEY WORDS: Aquatic Toxicity, Organics in Water, Lakehead University, Industrial Wastes, Fish Testing, Biological Testing, Hazardous Compounds.

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. G. W. Ozburn and Dr. D. E. Orr, Department of Biology, Lakehead University, Thunder Bay, Ontario P7B 5E1

LIAISON OFFICER OR SUPERVISOR: G. R. Craig, Water Resources Branch

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

OBJECTIVE:

To determine the effective biological concentrations of selected organics commonly discharged in industrial wastes.

The effects of individual industrially related organic compounds on fish reproduction as well as rates of accumulation and depuration of those organics will be determined. Mixtures of the individual organics will also be tested to determine their joint toxicity effects on the same biological parameters.

DESCRIPTION:

Exposure of flagfish to these selected organics will identify concentrations that impair or inhibit egg production, hatching success, fry survival and growth. Bio-concentration factors due to uptake from water will also be determined. Rates of uptake through food will be determined in rainbow trout to establish food chain effects.

Once individual organic effects are established, mixtures of those organics representative of concentrations found in river systems will be tested to determine synergistic, additive or antagonistic effects on reproduction and bio-accumulation.

Concentrations of industrial organic compounds that produce detrimental effects on fish reproduction and recruitment will be established. Levels of organics accumulation that impair or reduce the edibility of sport and commercial fish will be determined in light of biological, chemical and mutagen/carcinogen studies reported in the literature or under study in other environmental laboratories.

DURATION OF PROJECT: 3 YEARS *PRESENT YEAR IS:* 1st YEAR *REPORTING DATE:* 1984

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$340,440	$53,300 from M.O.E.	None from M.O.E.	

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

No. This project is supported in FY 80/81 with Bridge Funding from Lottery Project No. 48.

REMARKS:

Partners in FY 80/81 were Environment Canada and M.O.E. Hazardous Contaminants Co-ordinator. Provincial Lottery Project No. 80-049-33.

Ministry of the Environment
Ontario

PL-22

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* APRIL 1981

PROJECT TITLE:

INCREASED DISEASE SUSCEPTIBILITY AFTER PCB EXPOSURE

KEY WORDS: PCB's, Disease Susceptibility, Immune System, Exposure to PCB's, Halogenated Organic Compounds

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. J. Gauldie, Ph.D., Associate Professor, Dept. of Pathology, McMaster University, Hamilton, Ontario L8N 3Z5

LIAISON OFFICER OR SUPERVISOR: P. D. Foley, Pollution Control Branch

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

OBJECTIVE:

When the project was begun, the opinion existed that there were changes in the immune system caused by exposure to PCBs. A number of findings show that there is a significant aberration in the immune response after such exposure.

The proposal that is herewith described deals with a continuation of the investigation started in Project No. 26 of establishing the effects caused by the exposure to PCBs.

DESCRIPTION:

A study of the immunotoxicity of different halogenated aromatic hydrocarbons in mice will be extended to relate selective suppression of the generation of killer T cells to susceptibility to viral infections. Purified PCB isomers will be compared to TCDD with respect to their dose-dependent effect on the immune system and susceptibility to herpes and influenza viruses. The T cell subpopulation most sensitive to PCBs and TCDD will be defined.

The findings of a "no effect" dose for TCDD will be pursued for other PCBs and should provide a gradation of toxicity for the isomers of these compounds.

The findings may prove beneficial in defining the extent and limits of altered physiology caused by exposure to these toxins.

DURATION OF PROJECT: 4 *YEARS* *PRESENT YEAR IS:* 3rd *YEAR* *REPORTING DATE:* 1984

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$131,401	$62,285	None from M.O.E.	

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:
Yes. Ministry of Labour in FY 80/81 and possibly in FY 82/83.

REMARKS:

Provincial Lottery Project No. 80-050-32.
(An extention of Provincial Lottery Project No. 26).

Ministry of the Environment
Ontario

WMAB-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management Advisory Board *DATE:* July 17, 1981

PROJECT TITLE:
Urban Solid Waste Generation in Ontario

KEY WORDS: Solid Waste

PRINCIPLE INVESTIGATOR AND AFFILIATION Professor M. Hare

LIAISON OFFICER OR SUPERVISOR Peter Crabtree

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

OBJECTIVE:
To assess the current annual generation rate of municipal solid waste in Ontario as an update of the Board's previous work in 1976.

DESCRIPTION:
The report will establish current total quantities of municipal solid waste generated in Ontario, by major categories (e.g., residential, light commercial); this will develop into per capita levels and trends and a review of percentage composition by major material constituents.

DURATION OF PROJECT 1/2 *YEARS* *PRESENT YEAR IS* Final *YEAR* *REPORTING DATE* October 1981

BUDGET:

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

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

IS A REPORT ANTICIPATED? Yes - Consultant's report to the Board.

PARTICIPATION BY OTHER MINISTRIES: -

REMARKS:

Ministry of the Environment
Ontario

WMAB-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management Advisory Board *DATE:* July 17, 1981

PROJECT TITLE:
A Program to Monitor the Progress of Source Separation in Ontario

KEY WORDS: Source Separation Monitoring

PRINCIPLE INVESTIGATOR AND AFFILIATION Currie, Coopers & Lybrand, Ltd.

LIAISON OFFICER OR SUPERVISOR Peter Crabtree

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

OBJECTIVE:
To develop a monitoring system for checking the progress of source separation programmes in Ontario.

DESCRIPTION:
The system will keep track of the flows and cost of recovery of secondary materials resulting from source separation programmes on an on-going basis, including market prices, so that appropriate information is made available for use by municipalities, recycling groups, waste management companies and provincial agencies.

DURATION OF PROJECT 3/4 *YEARS* *PRESENT YEAR IS* Final *YEAR* *REPORTING DATE* January 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	47,000	47,000	N/K	N/K

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

IS A REPORT ANTICIPATED? Yes - A working system is being developed.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

WMAB-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management Advisory Board *DATE:* July 17/81

PROJECT TITLE:
Guidelines for Recovering Used Motor Oil from Do-It-Yourself Oil Changers

KEY WORDS:
Waste Oil Recovery

PRINCIPLE INVESTIGATOR AND AFFILIATION
Glen Wood, Research Consultant
Douglas Lintula, Editorial "

LIAISON OFFICER OR SUPERVISOR
J. W. Cook

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

OBJECTIVE:
To produce an implementation manual to aid in the successful recovery of used motor oil - for reuse purposes - from motorists who change their own motor oil in Ontario.

DESCRIPTION:
Following a two-year pilot implementation program in Kitchener-Waterloo for the recovery of used motor oil from do-it-yourself oil-changers (utilizing service stations as depots) and in recognition of the increasing need by re-refineries for an increased supply of used oil, it was agreed by government and the oil industry that guidelines on how to set up a recovery program would be most useful. The guidelines should be of interest to motor oil manufacturers and distributors, mass merchandisers of automotive products, service station operators, waste oil collectors, re-refining companies, municipalities, and special interest groups concerned with environmental matters and energy conservation.

The guidelines describe different systems for recovering used motor oil, including equipment requirements, and provide promotional ideas and information sources.

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

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	6,500	6,500	1/2	1/2

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

IS A REPORT ANTICIPATED? Yes - A "how to" manual

PARTICIPATION BY OTHER MINISTRIES:
No other provincial ministries participated; however, the guidelines were produced jointly with Environment Canada.

REMARKS:

Ministry of the Environment
Ontario

WMAB-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management Advisory Board *DATE:* July 17/81

PROJECT TITLE:
Glass Markets in Ontario

KEY WORDS: Glass Markets, Glass Recycling

PRINCIPLE INVESTIGATOR AND AFFILIATION Michael K. Berkowitz

LIAISON OFFICER OR SUPERVISOR J. W. Cook

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

OBJECTIVE:
To examine the determinants of the price paid for waste glass (cullet) and to examine the methods for increasing the recovery of this resource in Ontario.

DESCRIPTION:
The study presents a review of the Ontario glass manufacturing industry, evaluates alternative methods for increasing glass recovery, makes a comparison between the value of the factors displaced by cullet and the price of cullet, provides a model for determining the least-cost glass collection program, and analyses the implications of alternative methods for increasing the recovery and recycling of waste glass in Ontario.

This study was undertaking by the Board as it was felt that it would make a valuable contribution to the implementation of the Province's waste materials recovery program.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1981 *YEAR* *REPORTING DATE* March /81

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	14,500	14,500	1/2	1/2

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

WM-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management *DATE:* February 1980

PROJECT TITLE: Evaluation of Ministry of Environment Organic Waste (Compost) for Modification of Turf Grass and Root Zones

KEY WORDS: compost, turf grass

PRINCIPLE INVESTIGATOR AND AFFILIATION: Associate Professor J. L. Eggens, University of Guelph Horticultural Science

LIAISON OFFICER OR SUPERVISOR: P. J. Provias

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

OBJECTIVE:

To determine the suitability of organic waste material in the form of compost from the Experimental Resource Recovery Plant of the M.O.E. as an organic soil amendment for (a) high foot traffic areas (b) turf grass by seed or sod on excessively drained sites such as gravel pits.

DESCRIPTION:

Greenhouse: Various turf grass specimens will be grown in pot cultures using different soils in conjunction with the compost.

Field Research: Plots will be prepared in selected field areas (Central Research Station), Hespeler. Various root zone mixtures and the effect of foot traffic uniformly applied by a mechanical wear machine will be studied. Compost effect on seed and sod in well drained sites (gravel pits) will be evaluted.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* May 1982

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$21,244.00	$10,000.00	2	

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

IS A REPORT ANTICIPATED? Yes.
Status reports April '81, Oct. '81, final report May '82.

PARTICIPATION BY OTHER MINISTRIES: Ministry of Agriculture and Food (Central Research Station, Hespeler).

REMARKS:

Ministry of the Environment
Ontario

WM-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management

DATE: April 1980

PROJECT TITLE: Compost - As a Media Amendment for Container Production

KEY WORDS: Compost, container growing

PRINCIPLE INVESTIGATOR AND AFFILIATION: Associate Professor Glen Lumis, University of Guelph Horticultural Science

LIAISON OFFICER OR SUPERVISOR: P. J. Provias

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

OBJECTIVE:

To determine the most feasible production techniques to overcome high pH and soluble salt levels of compost produced at the E.R.R.P. and thus provide an acceptable growing medium.

DESCRIPTION:

Several deciduous and evergreen species will be grown in 6 litre pots for two growing seasons. Several media containing compost will be tested for parameters of plant root and shoot growth.

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

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$1,500.00		$1,000.00	

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

IS A REPORT ANTICIPATED? Yes. Final report July 1981. Interim April 1981, October 1981.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

About 40 days work by technician involved in the growing tests.

Ministry of the Environment
Ontario

WM-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management

DATE: August 1980

PROJECT TITLE:
Compost Utilization, Demonstration Plan

KEY WORDS: Compost, sewage sludge, municipal solid waste

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. C. S. Baldwin, Head, Soils Section
Ridgetown College of Agricultural Technology

LIAISON OFFICER OR SUPERVISOR: N. R. Ahlberg and P. J. Provias

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

OBJECTIVE:

To determine that compost derived from sewage sludge and municipal solid waste can be utilized on agricultural lands without incurring a build-up beyond tolerable levels of such contaminants as heavy metals and pathogens.

DESCRIPTION:

The utilization demonstration will be conducted by the Ridgetown College of Agricultural Technology on suitable sites prepared by the soils department of the College, under the direction of Dr. Baldwin. The City of Windsor, Public Works Department will assist in the demonstration and will assume a portion of the cost for compost delivered from the E.R.R.P. (M.O.E.). Plots of approximately 0.5 acres in size will be treated with compost from both the Experimental Plant for Resource Recovery (E.R.R.P.), M.O.E. and the Windsor West Pollution Plant at rates of 53 tons and 106 tons per acre with appropriate control plots.

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$49,000.00		3	

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

IS A REPORT ANTICIPATED? Yes. Status report May 1981 if in time for growing season, otherwise December 1981.

PARTICIPATION BY OTHER MINISTRIES:
Ministry of Agriculture and Food.

REMARKS:
Reports at end of each growing season. Although this research grant is for a time period July 1, 1980 to December 31, 1981, the Chief Co-ordinator, Dr. Baldwin, has suggested a four or five year programme to validate research findings.

Ministry of the Environment
Ontario

WM-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management *DATE:* October 30, 1980

PROJECT TITLE:
Voluntary Intake of Shredded Newsprint by Dairy Cattle

KEY WORDS: Animal bedding, shredded newsprint

PRINCIPLE INVESTIGATOR AND AFFILIATION Associate Professor D. G. Grieve, Dept. of Animal and Poultry Science, University of Guelph

LIAISON OFFICER OR SUPERVISOR P. J. Provias

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

OBJECTIVE:
To determine levels of voluntary intake of newsprint by mature lactating cattle and note whether or not the animals consumed significant quantities of shredded newsprint when allowed free access to this material under different dietary conditions.

DESCRIPTION:

Shredded newsprint will be offered to lactating cows on a free choice basis to determine level of intake under different ration conditions. Ration treatments consisting of low (30%) medium (50%) and high (70%) roughage diets. A total of 12 Holstein cows will be used. Treatment periods will be 3 week intervals. Normal husbanding practices in a stall wing at Elora Dairy Cattle Research Centre will be followed. Measurement on individual cows will include daily ration intake, daily newsprint intake, daily milk production and bi-weekly milk composition.

DURATION OF PROJECT 1¼ YEARS *PRESENT YEAR IS* 1st YEAR *REPORTING DATE* August 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$14,611.00		$6,240.00	

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

IS A REPORT ANTICIPATED?
Yes. Interim reports October 1980, April 1981, Final August 1981

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

WM-5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT *DATE:* JUNE 3, 1981

PROJECT TITLE:
St. Thomas Greenhouse Heating Study

KEY WORDS: ENERGY, METHANE, SITE, PRODUCTION, GAS

PRINCIPLE INVESTIGATOR AND AFFILIATION CONESTOGA-ROVERS LIMITED

LIAISON OFFICER OR SUPERVISOR JOE PETOIA

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

OBJECTIVE:
To ascertain continued operation of a greenhouse heated with landfill produced meth ane.

DESCRIPTION:
Study involves pumping gas at different rates to ascertain production rates. Also investigating furnace technology and developing migration theory by "capping" the land filled area.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* ——— *YEAR* *REPORTING DATE* March 31, 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	26,000	26,000		

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:
ENV CANADA, Ministry of Energy

REMARKS:
Funding: ENV CANADA = $11,000.00
ENERGY = $30,000.00
M.O.E. = $26,000.00

Ministry of the Environment
Ontario

WM-6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management

DATE: June 3, 1981

PROJECT TITLE: Gas Migration Study

KEY WORDS: Gas, migration, methane, production

PRINCIPLE INVESTIGATOR AND AFFILIATION: Hydrology Consultants Ltd.

LIAISON OFFICER OR SUPERVISOR: Joe Petoia

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* X
MULTI-YEAR PROJECT 3 *CONCURRENT PROJECT* ——

OBJECTIVE:

To obtain sufficient data on gas production/migration in order to provide regions with guiedlines re the use of land on or near closed waste disposal sites.

DESCRIPTION:

Study of 9 production/migration sites; 3 inert sites; 5 sites with gas control mechanisms. Will ascertain best system under certain conditions. Temperature, pressure, monitoring probes installed at jey locations to get data.

Study will also do complete state of the art and prepare library.

DURATION OF PROJECT: 3 *YEARS* — *PRESENT YEAR IS* 3 *YEAR* — *REPORTING DATE:* June 1982

BUDGET: $287,500.00

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$178,000.00	$109,000.00		

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

IS A REPORT ANTICIPATED? Yes.

PARTICIPATION BY OTHER MINISTRIES: ENV Canada, USEPA (Somewhat).

REMARKS:

Ministry of the Environment
Ontario

WM-7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management *DATE:* June 3, 1981

PROJECT TITLE:

Beare Road Feasibility Study

KEY WORDS: Gas, migration, energy, production, control

PRINCIPLE INVESTIGATOR AND AFFILIATION Conestoga-Rovers Associates

LIAISON OFFICER OR SUPERVISOR Joe Petoia

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

OBJECTIVE:

To ascertain the feasibility of using gas generated from the Beare Road W.D.S. to heat the Metro Zoo, a greenhouse, or a ski chalet.

DESCRIPTION:

Consultants will:

1. assess landfill for gas production;
2. assess technical feasibility of transporting gas;
3. conduct cost analysis of heating/pumping/transporting gas to zoo, chalet, greenhouse, etc.

DURATION OF PROJECT 4 mo. —— *YEARS* *PRESENT YEAR IS* —— *YEAR* *REPORTING DATE* August 1981

BUDGET: $20,000.00

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$20,000.00	$20,000.00		

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: Energy, Metro Toronto

REMARKS:

*Study funded by Ministry of Energy $10,000.00
Metro Toronto $10,000.00
Chaired by Ministry of the Environment.

Ministry of the Environment
Ontario

WM-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT *DATE:* 3/6/81

PROJECT TITLE:
REMOTE SENSING TECHNIQUES AND WASTE MANAGEMENT ASSESSMENT STUDY

KEY WORDS: REMOTE SENSING, WASTE DISPOSAL SITE

PRINCIPLE INVESTIGATOR AND AFFILIATION M.M. DILLON LIMITED

LIAISON OFFICER OR SUPERVISOR Mr. Leslie A. Ficzere, P. Eng.

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

OBJECTIVE:
The objective of the study is to develop remote sensing techniques such as infrared colour true colour, and thermal imagery in order to assist in identifying areas, previously landfilled and to identify environmental impacts arising from existing and former landfills due to leachate and gas production and migration.

DESCRIPTION:
An engineering applied research study is commissioned to determine the use of present remote sensing techniques.

DURATION OF PROJECT 1 —— *YEARS* *PRESENT YEAR IS* 1 —— *YEAR* *REPORTING DATE* July 31, 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	88,100.00			

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:
N/A

REMARKS:

Ministry of the Environment
Ontario

WM-9

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT *DATE:* 30 June 1981

PROJECT TITLE:

RMC Plasma Arc PCB Destruction System

KEY WORDS:
Electric Arc, Plasma, PCB

PRINCIPLE INVESTIGATOR AND AFFILIATION T. Barton (Royal Military College, Kingston)

LIAISON OFFICER OR SUPERVISOR D.H. Edwards (Waste Management Branch)

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

OBJECTIVE:

To develop sufficient data to permit the design of an economically-viable commercial system of toxic chemical waste destruction based upon the use of a plasma arc torch.

DESCRIPTION:

A feasibility study into the use of a plasma arc torch for the disposal or destruction of toxic chemical wastes in particular, polychlorinated biphenyls (PCB). Much of the work hinges on developing an efficient effluent monitoring system to control the operation of the destructor.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* ——— *YEAR* *REPORTING DATE* Jan. 82

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	413 600	268 700	5	3.5

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

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

WM-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management

DATE: July 22,1981

PROJECT TITLE: Evaluation of the Use of RDF as a fuel in Clay Brick Manufacture

KEY WORDS: Refuse derived fuel, energy from waste, resource recovery

PRINCIPLE INVESTIGATOR AND AFFILIATION: Howard Penn, Brampton Brick Limited, Brampton, Ontario.

LIAISON OFFICER OR SUPERVISOR: N. R. Ahlberg, Waste Management Branch

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

OBJECTIVE:
To conduct laboratory research of the technical and economic evaluation of the use of refuse derived fuel as a burnout fuel in clay brick manufacture.

DESCRIPTION:
The use of finely shredded refuse derived fuel as a burnout fuel in clay brick manufacture is being investigated through a literature review and laboratory tests on bricks , incorporating finely shredded refuse derived fuel from the Experimental Plant for Resource Recovery. The physical and chemical characteristics of the resultant product will be assessed.

DURATION OF PROJECT ~~1~~ *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Dec 31,1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	25,000	25,000	0.25	0.25

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
Ministry of Energy

REMARKS:

Ministry of the Environment
Ontario

WM-11

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management

DATE: July 22,1981

PROJECT TITLE:

Experimental Plant for Resource Recovery

KEY WORDS: Resource Recovery, Waste Management, shredding, refuse derived fuel, ferrous, research.

PRINCIPLE INVESTIGATOR AND AFFILIATION N. R. Ahlberg, Waste Management Branch, Ministry of the Environment

LIAISON OFFICER OR SUPERVISOR N. R. Ahlberg

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

OBJECTIVE:

1. To develop and evaluate processes and equipment for resource recovery
2. To develop criteria for design and for estimating capital and operating costs
3. To provide a regular supply of recovered materials for product utilization and market development

DESCRIPTION:

The Experimental Plant for Resource Recovery processes 200 tonnes per day of solid waste through processes including shredding, air classification, screening, incineration and composting to recover materials for utilization within existing industry. Plant products include corrugated cardboard, refuse derived fuel, ferrous metal and compost. Products are either sold to industry or provided for market development projects.

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

BUDGET:
15,000,000
Captial Cost

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR* 1,700,000	*TOTAL PROJECT*	*CURRENT YEAR*
		Est. 60	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:

Regular reports issued on overall plant operations, reports on specific plant processes issued on an intermittent basis.

Ministry of the Environment
Ontario

WM-12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management

DATE: July 22,1981

PROJECT TITLE: Evaluation of the Use of Shredded Tires as a Bulking Agent for Sewage Sludge Composting

KEY WORDS: Composting, Tires, Sludge

PRINCIPLE INVESTIGATOR AND AFFILIATION: L. S. Romano, Director of Pollution Control, The Corporation of the City of Windsor.

LIAISON OFFICER OR SUPERVISOR: N. R. Ahlberg, Waste Management Branch

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

OBJECTIVE:

To use shredded rubber tires as a bulking agent for the aerated pile composting of sewage sludge to minimize bulking agent costs.

DESCRIPTION:

Shredded rubber tires will be used in place of wood chips as the bulking agent for the aerated pile composting of sewage sludge from the West Windsor Pollution Control Plant. The recovery rate of the tires screened from the finished compost will be determined through several composting cycles. The effects, if any, of the tires on the compost product will be determined through several composting cycles. These data will be compared to controls using wood chips as a bulking agent. The overall economies of using shredded rubber tires compared to wood chips will be established.

DURATION OF PROJECT: 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE:* Dec. 81

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$16,833.00	$16,833.00	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

WR-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources *DATE:* Sept. 1981

PROJECT TITLE: Phosphorus Loadings and Control Measures. Lake Simcoe Environmental Management Strategy.

KEY WORDS: Phosphorus Removal, Agricultural Pollution, Erosion, Urban Runoff, Modelling

PRINCIPLE INVESTIGATOR AND AFFILIATION S. Singer, River Systems Unit, Water Resources Branch
S. K. So

LIAISON OFFICER OR SUPERVISOR D. G. Weatherbe, River Systems Unit, Water Resources Branch

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

OBJECTIVE:
To estimate phosphorus loadings from the Holland Marsh to Lake Simcoe; causes or potential causes of these loadings, to identify control measures and their cost and effectiveness. To estimate phosphorus loads from major urban centers and identify remedial measures.

DESCRIPTION:
A detailed monitoring program is underway in drainage channels looking at nutrient concentrations and flow which will be used to prepare a nutrient budget of Holland Marsh (augmented by a field program on pollutant surface and tile drainage loadings from individual cropped fields). This will be incorporated in an agricultural runoff model - ANSWERS - which will be used to predict future loads and the effect of remedial measures and for extrapolating these findings to other areas in the basin. Urban runoff pollution and control measures will be estimated using state-of-the-art models.

DURATION OF PROJECT 3 ——— *YEARS* *PRESENT YEAR IS* 1 ——— *YEAR* *REPORTING DATE* March 1984

BUDGET: (Current year only Confirmed)

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		$80,000		2

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
Technical Committee represented by MNR, OMAF, South Lake Simcoe Conservation Authority and MOE

REMARKS:

Ministry of the Environment
Ontario

WR-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology & Monitoring

DATE: June 15, 1981

PROJECT TITLE:

Surface Water Quality Trends in Southwestern Ontario, 1964-1980

KEY WORDS:

Surface water quality, trends

PRINCIPLE INVESTIGATOR AND AFFILIATION: V. I. Chin, H & M Section

LIAISON OFFICER OR SUPERVISOR: U. Sibul, Head, Resource Assessment

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

OBJECTIVE:

1. to determine water quality trends at long-term, active stations in Southwestern Ontario;
2. to determine the status of water quality at both long and short-term, active stations in Southwestern Ontario; and
3. to relate trends in and the status of water quality to stream uses and man's activities.

DESCRIPTION:

The Hydrology & Monitoring Section initiated a program in 1980 to examine trends in surface water quality in Ontario. The program is divided into two phases: the first phase (in printing) to provide a cursory assessment of trends in the Province, and the second phase to examine trends of specific water quality variables in smaller areas in greater detail. The present project to examine trends of specific water quality variables in Southwestern Ontario is the first of a series of planned reports that represent the second phase of the trends program.

DURATION OF PROJECT: 1 YEARS

PRESENT YEAR IS: 1 YEAR

REPORTING DATE: 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$34,000	$34,000	1½	1½

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

IS A REPORT ANTICIPATED? Yes. Mid 1982

PARTICIPATION BY OTHER MINISTRIES: Nil

REMARKS:

Ministry of the Environment
Ontario

WR-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology & Monitoring *DATE:* June 15, 1981

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* 4 *YEAR* *REPORTING DATE* Annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$20,000		½

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

IS A REPORT ANTICIPATED? Compliance report 1981; Annual reports for the year 1981 and on Methodology report 1981.

PARTICIPATION BY OTHER MINISTRIES:
Nil

REMARKS:

Ministry of the Environment
Ontario

WR-4

RESEARCH AND DEVELOPMENT INVENTORY

1979/80 Projects

BRANCH: Water Resources - Hydrology and Monitoring *DATE:* June 26, 1981

PROJECT TITLE:
Application of Geophysical Techniques to Ground-Water Studies

KEY WORDS: Ground-water exploration; Ground-water contamination; Geophysics, remote sensing, seismic explorations, electrical resistivity.

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. E. Rodrigues, Chief, Geotechnical Services Unit

LIAISON OFFICER OR SUPERVISOR as above

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

OBJECTIVE: To enhance the application of geophysical techniques to ground-water supply and contamination studies in order to develop geophysics as an inexpensive method for subsurface hydrogeologic investigations.

DESCRIPTION: As labour costs escalate, making the installation of observation wells and carrying out test drilling for ground-water exploration and contamination studies more costly, the use of geophysical techniques for subsurface investigations is being increased. It is anticipated that existing geophysical techniques can be developed to aid in the tracing of contaminant plumes and defining soil attenuating capacities. This work is part of the continuing service function of the Geotechnical Services Unit.

DURATION OF PROJECT Continuing —— *YEARS* *PRESENT YEAR IS* 8 *YEAR* *REPORTING DATE* Ongoing

BUDGET:

	TOTAL DOLLARS	MAN YEARS
	CURRENT YEAR	CURRENT YEAR
	$60,000	2

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

IS A REPORT ANTICIPATED?
Reports are prepared on various projects and aspects as work progresses.

PARTICIPATION BY OTHER MINISTRIES:
Nil

REMARKS:
Service function primarily to Regional Staff; however, requests for assistance from MTC, DOE and universities are answered.

Ministry of the Environment
Ontario

WR-5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology & Monitoring

DATE: June 15, 1981

PROJECT TITLE: Feasibility Study: Flow Augmentation of the Avon River using Ground Water Sources

KEY WORDS: Water quality, flow augmentation, ground water

PRINCIPLE INVESTIGATOR AND AFFILIATION: U. Sibul, Head, Resource Assessment Group

LIAISON OFFICER OR SUPERVISOR: as above

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

OBJECTIVE:

To determine the feasibility of using ground water sources up or downstream of the City of Stratford to augment flows in the Avon River during low flow periods.

DESCRIPTION:

The purpose of such flow augmentation (approximately 1-3 cfs above normal flows) would be:

1. to reduce instream nutrient concentrations and, therefore, aquatic plant growth;
2. to increase instream dissolved oxygen levels (as a result of reduced plant growth and possibly as a result of increased reaeration rates);
3. to encourage the flushing of aquatic plant material through the river system; and
4. to reduce levels of other contaminants which are occasionally of concern (such as heavy metals and indicator bacteria).

DURATION OF PROJECT: 1½ *YEARS* — *PRESENT YEAR IS* 1st *YEAR* — *REPORTING DATE:* December 31, 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$6,000	$6,000	1/3	1/3

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: Nil

REMARKS:

Ministry of the Environment
Ontario

WR-6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology & Monitoring

DATE: June 15, 1981

PROJECT TITLE: APIOS Ground Water Studies

KEY WORDS: Ground water, acidification, APIOS

PRINCIPLE INVESTIGATOR AND AFFILIATION: U. Sibul, Head, Resource Assessment Group

LIAISON OFFICER OR SUPERVISOR: as above

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

OBJECTIVE:

To determine ground water quality in the APIOS program in northern Ontario and to assess the contribution of ground water in the Ministry's calibrated watersheds in the Muskoka-Haliburton area.

DESCRIPTION:

Two separate phases of work are being undertaken:

1. to conduct an inventory of ground water quality, especially its acidity, in pre-selected areas on the Canadian Shield in Northern Ontario, and

2. to determine the impact that ground water has on stream and lake water quality in the Ministry's calibrated watersheds; part of this work will involve research-related activity into the natural processes that determine ground water quality in the Shield area.

DURATION OF PROJECT: see remarks *YEARS* — *PRESENT YEAR IS* 1 *YEAR* — *REPORTING DATE:* annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$100,000			3

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

IS A REPORT ANTICIPATED? Annual summary reports

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

The total scope of work on this project is not known at this stage; a better appreciation of the scope will be obtained after this initial year's work.

Ministry of the Environment
Ontario

WR- 7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology and Monitoring *DATE:* June 26, 1981

PROJECT TITLE:
Evaluation of the Long Term Impact of Pollutants in Ground Water.

KEY WORDS: Ground-water Contamination; Subsurface contaminants.

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. G. Hughes, Chief, Ground-Water Protection Unit

LIAISON OFFICER OR SUPERVISOR As above.

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

OBJECTIVE:
To examine the long-term impacts of contaminants in ground-water flow systems in order to allow for the development of Ministry policies relating to the prevention and clean up of leaks, spills, etc., in hydrogeologically sensitive areas.

DESCRIPTION:
At the present time it is often difficult to quantify the impact of leaks and spills of refined hydrocarbons, the presence of unprotected sand/salt storage facilities, and the occurrence of accidental spills of chemicals, etc., on areal ground-water conditions because of the nature and speed of contaminant movement in the subsurface and the complexities of local hydrogeology. In order to have meaningful policies and guidelines adopted to control the above-mentioned contaminating factors, it is necessary to promote an understanding of the long-term potential of the problem through careful documentation.

DURATION OF PROJECT Continuing YEARS *PRESENT YEAR IS* 8 YEAR *REPORTING DATE* - Periodic

BUDGET: *TOTAL DOLLARS CURRENT YEAR* $88,000 *MAN YEARS CURRENT YEAR* 3 1/2

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

IS A REPORT ANTICIPATED? Reports are prepared on various projects, project aspects and case histories as work progresses.

PARTICIPATION BY OTHER MINISTRIES:
Involved on MTC Contamination Committee and in liaison with Consumer and Commercial Relations and most hydrogeological consultants.

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology and Monitoring *DATE:* June 26, 1981

PROJECT TITLE:
Drainage Basin Inventory Studies

KEY WORDS: Basin; Water-resources inventory; Water management; Land use planning

PRINCIPLE INVESTIGATOR AND AFFILIATION V. Chin,

LIAISON OFFICER OR SUPERVISOR U. Sibul, Head, Resource Assessment Group

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

OBJECTIVE: To determine the inventory of surface and ground-water resources, both quantity and quality, in drainage basins in Ontario.

DESCRIPTION:
The basin inventories are designed to provide baseline water resources data and interpretation publications for future planning and water-resources management in Ontario. The studies are designed to ultimately cover all of the Province on the drainage basin scale. The project involves intensive surface and ground-water data gathering and analysis to determine integrated water resources in drainage basins. Major water uses and management alternatives are described.

DURATION OF PROJECT On-going *YEARS* *PRESENT YEAR IS* 18 *YEAR* *REPORTING DATE* on an average of one every eighteen months (see also remarks)

BUDGET:
TOTAL DOLLARS [redacted] *CURRENT YEAR* $80,000
MAN YEARS [redacted] *CURRENT YEAR* 3

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

IS A REPORT ANTICIPATED?
Every 18 months (approx.) "Water Resources Report" series.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:
Existing publications are for the following drainage basins: Big Otter Creek; Big Creek; Upper Nottawasaga River; Moira River; Duffins - Rouge; three reports for Northern Ontario; South Nation (in draft); Holland - Black (in draft); field work has begun in the Credit.

Ministry of the Environment
Ontario

WR-9

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology & Monitoring

DATE: June 15, 1981

PROJECT TITLE:
Hydrogeologic Mapping

KEY WORDS: Ground water, probability, susceptibility, hydrogeology

PRINCIPLE INVESTIGATOR AND AFFILIATION: K. T. Wang

LIAISON OFFICER OR SUPERVISOR: R. C. Ostry, Head, Technical Support Group

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

OBJECTIVE:

To determine 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: ongoing YEARS

PRESENT YEAR IS: 14 YEAR

REPORTING DATE: 18 months

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$40,000		2

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 81/82. Work has been completed for Simcoe (North Portion) and for Grey County. Work is progressing for the R.M. of Durham. 'The susceptibility of Ground Water to Contamination - St. Thomas Sheet' map has been completed as the second map in this series.

Ministry of the Environment
Ontario

WR-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources Branch *DATE:* June 1981.

PROJECT TITLE: Toronto Harbour Study

KEY WORDS: Nearshore currents, Water Quality, harbour-lake exchange, modelling, trend analysis,

PRINCIPLE INVESTIGATOR AND AFFILIATION D. Poulton, B. Kohli, Lake Systems Unit, Great Lakes Section

LIAISON OFFICER OR SUPERVISOR R. Weiler

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

OBJECTIVE: Developing a water management plan for the waterfront area, including the Toronto inner and outer harbours by collecting limnological field data on currents, circulation patterns and nearshore-offshore exchanges; developing a comprehensive model for the simulation and prediction of the effects of landfilling and dredged spoil disposal, dispersion of effluents from municipal and industrial outfalls, movement of potential spills; evaluation of various management options designed to protect municipal water intakes, bathing beaches and recreational uses along the waterfront.

DESCRIPTION

- Current patterns will be neasured between Humber Bay and R.C. Harris intake to determine the dispersion of dredged materials and of effluents from the Main Sewage Treatment Plant at Ashbridges Bay; and the circulation patterns and currents in the area.
- A model for wind-driven nearshore circulation will be evaluated and calibrated for simulation of the effects of future shore-line changes and outfalls;
- Methodologies for calculating nearshore-offshore exchange will be evaluated.

DURATION OF PROJECT 4 *YEARS* *PRESENT YEAR IS* 1 *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*
		86,000		2.0

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 Commision, 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: verification and preliminary stormwater runoff results.
B. Kohli: Physical aspects of Toronto Harbour.

Ministry of the Environment
Ontario

WR-11

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources Branch *DATE:* June 1981.

PROJECT TITLE:
Nanticoke: Currents and Water Quality

KEY WORDS:
Water Movement; water quality; thermal discharge

PRINCIPLE INVESTIGATOR AND AFFILIATION B. Kohli, R. Weiler, Lake Systems Unit, Great Lakes Section

LIAISON OFFICER OR SUPERVISOR R. Weiler

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X — *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 Developement and Texaco's refinery and other industrial and urban developement in the Nanticoke area. These projects are part of the larger nearshore monitoring program of the Nanticoke Environmental Commitee.

DESCRIPTION:
- The monitoring of water quality will be continued;
- An integrated report of the results of all of the studies for the period 1968-1978 will be prepared with MNR;
- Reports on water quality and current measurements in 1980 will be prepared.

DURATION OF PROJECT 15 *YEARS* *PRESENT YEAR IS* 12 *YEAR* *REPORTING DATE* annually

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		22,000		0.5

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

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:
Natural Resources; Ontario Hydro; Stelco; Texaco.

REMARKS:
Reports published: Water chemistry, 1970, 1969-71, 1972, 1973, 1974, 1975, 1976, 1977 (M. Palmer, J. Polak), 1978 (I. Heathcote), 1979 (J. Tanner)*,
Currents: 1967-70 (M. Palmer, R. Walker), 1974, 1975, 1976, 1977, 1978, 1967-1978, (B. Kohli)
* 1969-1978(R. Weiler, I.Heathcote).

Ministry of the Environment
Ontario

WR-12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources *DATE:* June 1981

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, Lake Systems Unit, Great Lakes 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. Develope models that simulate oxygen depletion. Determine what abatement programs are required for compliance, based on the processess and models.

DESCRIPTION:

- The models will be verified and used to predict the effects on oxygen levels of various management options and a report prepared;
- Draft summary reports of the chemical, biological and physical investigations since 1974 will be prepared;
- Three to four technical papers for publication in journals will be written.

DURATION OF PROJECT 7 *YEARS* *PRESENT YEAR IS* 7 *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*
		86000		2.0

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 1974,1975,1976,1977 (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(J.Great Lakes Res)

Ministry of the Environment
Ontario

WR-13

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources *DATE:* June 1981

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 F. C. Fleischer

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 multidisciplinary 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 34 separate projects in 1981/82. Twenty-eight projects involve field activities.

DURATION OF PROJECT ——— *YEARS* *PRESENT YEAR IS* 17th *YEAR* *REPORTING DATE* ———

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		2.402 million		54

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

WR-14

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: Sept. 15, 1981

PROJECT TITLE: Evaluation of Instream Management Practices (Stratford-Avon River Environmental Management Program)

KEY WORDS: Rivers, Algae, Aeration, Cropping

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. T. P. H. Gowda
Quality Protection Section, Water Resources Branch

LIAISON OFFICER OR SUPERVISOR: Dr. I. W. Heathcote, Quality Protection Section
Water Resources Branch

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

OBJECTIVE: Assess feasibility of instream management practices in improving instream dissolved oxygen levels in oxygen depressed reaches where further advanced sewage treatment is no longer cost-effective.

DESCRIPTION:

Artificial Oxygenation: Injection of liquid oxygen into stream to raise dissolved oxygen levels to minimum of 4 mg/L as required by MOE water quality objective.

Cropping of Aquatic Biomass: Using mechanical or labour intensive methods, carry out cropping of rooted or floating aquatic algae and weeds to prevent excessive oxygen concentration in critical periods.

Weir Aeration: Testing of a variety of weir types designed to maximize aeration of stream waters.

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS: 2 YEAR — REPORTING DATE: March 1982

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
$50,000	$30,000	4	2

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
MNR on In-Stream Management Committee which directs project

REMARKS: Part of Stratford-Avon Environmental Management Program

Ministry of the Environment
Ontario

WR-15

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources *DATE:* Sept. 1981

PROJECT TITLE: Assessment and Control of Agricultural Non-Point Source Pollution in the Stratford-Avon Enviornmental Management Project

KEY WORDS: Agricultural Pollution, Erosion, Modelling

PRINCIPLE INVESTIGATOR AND AFFILIATION S. N. Singer, Chief Regional Services, River Systems Unit

LIAISON OFFICER OR SUPERVISOR D. G. Weatherbe, Head, River Systems Unit, Water Resources Branch

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

OBJECTIVE: To estimate pollutant loads from all rural areas in the Avon River watershed; to demonstrate and evaluate the cost and effectiveness of control measures; and to include these concerns in the development of an overall management plan for the basin.

DESCRIPTION:

New methodologies developed in the Grand River Basin Study for characterizing the pollution potential of agricultural land taking into account soil type, physiography, cropping practices and animal practices are being applied. A square grid model - ANSWERS - is being improved to predict event hydrographs and pollutographs for all agricultural areas in the basin.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* March 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$182,500	$123,500	6	3½

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

See Remarks

REMARKS: Work is directed by Rural Subcommittee of the SAREMP project, which includes membership from MOE, Upper Thames Conservation Authority, MNR, OMAF. Additional work for the project is being undertaken by Lands Directorate of Environment Canada.

Ministry of the Environment
Ontario

WR-16

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: Sept. 15, 1981

PROJECT TITLE: Spill Dispersion in Rivers

KEY WORDS: Spill Dispersion, Toxic Contaminants, Emergency Response, Water Quality Modelling

PRINCIPLE INVESTIGATOR AND AFFILIATION: T. P. H. Gowda, Quality Protection Section, Water Resources Branch

LIAISON OFFICER OR SUPERVISOR: D. G. Weatherbe, Quality Protection Section, Water Resources Branch

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

OBJECTIVE:

To assess the impact of accidental contaminant spills on downstream water quality in rivers.

DESCRIPTION:

A Spill Dispersion Model will be developed to predict the dispersion of materials accidentally spilled into rivers. Predictions will include estimates of time of passage of an effluent cloud past a given control point, and the concentration of the pollutant as it moves downstream. The model will therefore be useful for water resources managers in reducing public health risks while minimizing cautionary periods.

DURATION OF PROJECT: 1 YEARS

PRESENT YEAR IS: 1 YEAR

REPORTING DATE: Feb. 1, 1982

BUDGET:

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

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

IS A REPORT ANTICIPATED?

Final Report on Model Development and Application Feb. 1, 1982

PARTICIPATION BY OTHER MINISTRIES:

None

REMARKS:

Work to be based on preliminary modelling study carried out for the Grand River Basin Water Management Study.

Ministry of the Environment
Ontario

WR-17

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: Sept. 15, 1981

PROJECT TITLE:
Contaminant Dynamics of Rivers with Emphasis on Mercury

KEY WORDS:
Water Quality, Modelling, Mercury Amelioration, Fugacity, Toxic Contaminant

PRINCIPLE INVESTIGATOR AND AFFILIATION D. Mackay, University of Toronto

LIAISON OFFICER OR SUPERVISOR Dr. I. W. Heathcote, Quality Protection Section
Water Resources Branch

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

OBJECTIVE: To choose, investigate and adapt a chemical process model for hazardous contaminant dynamics in river systems; to demonstrate the use of the model for total-methyl mercury dynamics in a typical subsection of the Wabigoon River.

DESCRIPTION: A Chemical Process Model using the "fugacity" approach is under development to address a variety of processes important in contaminant dynamics. The model will incorporate simplistic hydraulics, but will have the capability to simulate chemical processes in detail. It will be used to assess the feasibility of potential amelioration measures for rivers contaminated with mercury and other toxins.

DURATION OF PROJECT 0.5 *YEARS* — *PRESENT YEAR IS* 1 *YEAR* — *REPORTING DATE* Sept. 1981

BUDGET:

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

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

IS A REPORT ANTICIPATED?
Final report with copies of and documentation for computer models.

PARTICIPATION BY OTHER MINISTRIES:
None

REMARKS:

Ministry of the Environment
Ontario

WR-18

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: Sept. 15, 1981

PROJECT TITLE:

Stratford-Avon River Environmental Management Project

KEY WORDS: Water Quality, Modelling, Aquatic Plant, Algae, Dissolved Oxygen

PRINCIPLE INVESTIGATOR AND AFFILIATION Dr. I. W. Heathcote, Quality Protection Section Water Resources Branch

LIAISON OFFICER OR SUPERVISOR D. G. Weatherbe, Quality Protection Section, Water Resources

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

OBJECTIVE: To adapt and implement water quality models to analyze water quality effects and to design, evaluate and optimize water management strategies for existing and projected urban, rural, and instream flow and loading conditions.

DESCRIPTION: Water Quality Models and an Ecological Simulation Model, originally developed for the Grand River Study, were adapted and applied to water quality simulations of the Avon River downstream of Stratford. Both steady-state and dynamic, continuous models were used, accounting for varying hydrological, waste loading and meteorological effects.

Simulations were made of flows, and nutrient, dissolved oxygen, and suspended solids concentrations in the river, and asssociated plant growth regimes over a growing season.

DURATION OF PROJECT 2 *YEARS* — *PRESENT YEAR IS* 2 *YEAR* — *REPORTING DATE* April 1982

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
$100,000	$60,000	5	3

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

IS A REPORT ANTICIPATED?
SAREMP Technical Report Series: Final Water Management Report April 1982

PARTICIPATION BY OTHER MINISTRIES:

None

REMARKS: Work as outlined is being undertaken as part of the overall Stratford-Avon River Environmental Project, involving the Ministry of the Environment, Ministry of Natural Resources, Ministry of Agriculture and Food, and Upper Thames River Conservation Authority as major participants.

Ministry of the Environment
Ontario

WR-19

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources *DATE:* July 2, 1981

PROJECT TITLE: Acidic Precipitation in Ontario Studies: Hydrologic Analyses, Watershed Modelling and Application

KEY WORDS: Acidic Precipitation, Chemistry Budget, Modelling, Lakes, Streams, Ecology, Sensitivity, Prediction

PRINCIPLE INVESTIGATOR AND AFFILIATION L. Logan, Quality Protection Section

LIAISON OFFICER OR SUPERVISOR D. Weatherbe, Quality Protection Section

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

OBJECTIVE: To develop suitable watershed models for use as analytical tools in predicting runoff output to lakes, in complement with chemistry budget studies in lake systems in Ontario.

DESCRIPTION: Methods are required for predicting changes in the acidic levels in lakes and streams in Ontario. This is necessary as a basis for setting guidelines for carrying out neutralization studies and other abatement programs on the acidic precipitation effects on the lake systems. In complement with chemical budget studies, hydrologic analyses and modelling are used to evaluate the lake regimes. Other supporting activities to support the chemical budget analysis are fine-time scale studies on soil moisture movement, evaporation, snowmelt and spring runoff.

DURATION OF PROJECT 1 —— *YEARS* *PRESENT YEAR IS* 1 —— *YEAR* *REPORTING DATE* March 31, 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$41 K		

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

IS A REPORT ANTICIPATED? Watershed runoff predictions in lake systems susceptible to acidic precipitation.

PARTICIPATION BY OTHER MINISTRIES: Separate acidic precipitation on lake studies by the Ministry of Natural Resources.

REMARKS: This study is a part of the acidic precipitation studies being carried out in the Water Resources Branch under the direction of the Limnology Section in the Dorset project area.

Ministry of the Environment
Ontario

WR-20

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: July 1981

PROJECT TITLE: Acidic Precipitation in Ontario Study

KEY WORDS: Acidification, acidic precipitation, depositions, susceptibility

PRINCIPLE INVESTIGATOR AND AFFILIATION P.J. Dillon, Limnology Unit

LIAISON OFFICER OR SUPERVISOR T.G.Brydges

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

OBJECTIVE:
To quantify the physical, chemical and biological effects of acidic inputs to lakes.

DESCRIPTION:
The intensive studies on the characterization of the effects of acidic inputs are being conducted on lakes in **Muskoka-Haliburton.** It involves a calibrated lake and watershed approach over many years.

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

BUDGET: **$610,000**
TOTAL DOLLARS — *TOTAL PROJECT* — *CURRENT YEAR*
MAN YEARS — *TOTAL PROJECT* — *CURRENT YEAR*

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: Ministry of Natural Resources

REMARKS:

Ministry of the Environment
Ontario

WR-21

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources *DATE:* July 1981

PROJECT TITLE: Ontario Experimental Neutralization Study

KEY WORDS: Neutralization, acidification

PRINCIPLE INVESTIGATOR AND AFFILIATION P.J. Dillon

LIAISON OFFICER OR SUPERVISOR T.G.Brydges

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

OBJECTIVE:
To determine if neutralization of lakes can be used to protect endangered aquatic ecosystems in acid stressed lakes and restore fish and other biota in highly acidic lakes.

DESCRIPTION:
1) Field studies in both the Sudbury and the Haliburton area are planned.
2) The neutralization programme is experimental.
3) Neutralization experiments are to be conducted for either of two purposes - renovation of acidic waters or maintenance of fish stocks in acid-stressed waters.

DURATION OF PROJECT 5 yrs. *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* ——

BUDGET: *TOTAL DOLLARS* *TOTAL PROJECT* $700K *CURRENT YEAR* *MAN YEARS* *TOTAL PROJECT* *CURRENT YEAR*

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
Ministry of Natural Resources

REMARKS:

total $ 1,310,000.00

Ministry of the Environment
Ontario

WR-22

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources *DATE:* July 1981

PROJECT TITLE: FILAMENTOUS ALGAE PROGRAMME

KEY WORDS: Filamentous algae, Cladophora, monitor, nutrients, heavy metals, PCB's, Acidification

PRINCIPLE INVESTIGATOR AND AFFILIATION Michael B. Jackson, Limnology & Taxonomy Section

LIAISON OFFICER OR SUPERVISOR Kenneth H. Nicholls, Limnology & Taxonomy Section

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

OBJECTIVE:
1) To determine the effects of acidification on the distribution and abundance of filamentous algae in Ontario inland lakes and streams.
2) To assess phosphorus control strategies for the Great Lakes relative to Cladophora growth requirements.
3) To apply Cladophora tissue analysis to biomonitor long term trends in nearshore trace contaminants (nutrients, heavy metals, PCB's) in the Great Lakes.

DESCRIPTION:
1) Investigations of filamentous algae and controlling environmental factors, especially the role of pH in Ontario inland lakes and streams.
2) Monitoring Cladophora growth and environmental parameters at a single site in Lake Ontario in conjunction with I.J.C. lake-wide limnological investigations.
3) Surveillance of Cladophora heavy metal, PCB and nutrient levels in Lake Ontario and the Niagara River in cooperation with investigations by I.J.C. and other goverment agencies.

DURATION OF PROJECT Ongoing *YEARS* *PRESENT YEAR IS* ——— *YEAR* *REPORTING DATE* As information made available

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR 65K services only	TOTAL PROJECT	CURRENT YEAR

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

IS A REPORT ANTICIPATED? One available - others planned

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

WR-23

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: July 1981

PROJECT TITLE:
Marshland Project

KEY WORDS:

PRINCIPLE INVESTIGATOR AND AFFILIATION: Mrs. I. Wile

LIAISON OFFICER OR SUPERVISOR: Dr. P.J. Dillon

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

OBJECTIVE:
To determine the potential of wetlands for year round sewage treatment - in particular the studies are attempting to define the degree of pretreatment of the waste required prior to discharge to the wetlands, loading rates and retention times for optimal operating conditions, land requirements and operational costs.

DESCRIPTION:
The artificial marsh system, constructed adjacent to the Town of Listowel's sewage treatment lagoons, commenced operations in August of 1980. It is comprised of five separate treatment systems and a small control marsh to be used for monitoring rates of evapotranspiration. System #1 consists of a shallow marsh, a pond and channelled marshes. It is operated in series and receives wastewater from the existing Listowel lagoon. System #2 (shallow marsh), and System #3 (channelled) also receive lagoon effluent. Systems #4 and #5 are duplicates of the latter two systems but receive raw wastewater from an existing aeration cell. All cells, except the pond, have been compacted and backfilled with a mixture of sub-soil, top soil and peat and planted with cattails, Typha spp. Each system is extremely flexible and capable of operation of 0.5 to 2 times average design flow and at variable depths and retention times. In Bradford, Ontario a small fully instrumented natural marsh was monitored for 2 years to establish natural nutrient fluxes. Sewage additions (mixed raw sewage and final effluent from the Bradford S.T.P.) to this natural marsh commenced in June 1981. Both the quantity and the strength of the sewage can be varied to assess the performance of this marsh at different sewage loadings

DURATION OF PROJECT: 3 *YEARS* — *PRESENT YEAR IS:* 3 *YEAR* — *REPORTING DATE:* 1st report published in 1980. Progress report spring/81. Final report at conclusion of project

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$80,000	9	3+1

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

IS A REPORT ANTICIPATED? Yes (technical papers and final report)

PARTICIPATION BY OTHER MINISTRIES:
No

REMARKS:

Provincial Lottery Fund	$335,340
London Region	$ 69,000
Water Resources	$213,000 (including salary, benefits, etc.)

Ministry of the Environment
Ontario

WR-24

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: July 1981

PROJECT TITLE:
Algal assay methods for evaluating toxicity of metals and other contaminants in lakes

KEY WORDS: Toxicity, metals, organic compounds, algal assays

PRINCIPLE INVESTIGATOR AND AFFILIATION S.L. Wong - Plankton Taxonomy Unit

LIAISON OFFICER OR SUPERVISOR K.H. Nicholls

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

OBJECTIVE:

To develop and apply assay techniques for evaluation of toxic effects of metals and organic contaminants on aquatic biota.

DESCRIPTION:

Toxic effects of metals and several organic compounds on algae are being investigated in association with factors such as: pH changes, chelatin, nutrients and alkalinity

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

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT (evaluated annually)	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
				1.3

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

IS A REPORT ANTICIPATED? Two available now, others in progress

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

WR-25

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: July 1981

PROJECT TITLE:
(1) Urban Lakes, (2) Lake Restoration

KEY WORDS: (1) Urban Lake, stormwater impoundment; (2) Aeration, Destratification

PRINCIPLE INVESTIGATOR AND AFFILIATION: G. Robinson, Limnology and Taxonomy Section

LIAISON OFFICER OR SUPERVISOR: Dr. T.G.Brydges

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

OBJECTIVE:
(1) To examine urban stormwater impoundments, identify existing and potential problem areas, and recommend solutions.
(2) To improve water quality in small eutrophic lakes through the use of aeration and/or chemical inactivation techniques.

DESCRIPTION:
(1) Lakes Aquitane and Wabukayne - these two man-made lakes have been studied since they were constructed (1976-77).
- There are distinct differences in sedimentation basin designs and watershed areas.
- Problem areas include: Turbidity, road salt, Cladophora and floating debris.

(2) Heart (1975), Thompson (1971) and Eaton (1979) Lakes have been destratified through aeration since the year indicated.
- Thompson Lake has been aerated for several winters as well as was stocked with largemouth bass in 1980.

DURATION OF PROJECT: ——— YEARS
PRESENT YEAR IS: (1) 5th (2) 3rd-11th YEAR
REPORTING DATE: (1) 1981 (2) 1981

BUDGET:

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

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

IS A REPORT ANTICIPATED? To be published in proceedings of Int. Symp. on Inland Waters and Lake Restoration

PARTICIPATION BY OTHER MINISTRIES:
Heart Lake Conservation Authority (M.T.R.C.A.) assists with compressors

REMARKS:

Ministry of the Environment
Ontario

WR-26

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: July 1981

PROJECT TITLE:
Phosphorus Removal Studies

KEY WORDS: Phosphorus-removal, (1) Penetang-Midland (2) Bay of Quinte, (3) Gravenhurst

PRINCIPLE INVESTIGATOR AND AFFILIATION: G. Robinson - Limnology & Taxonomy Section

LIAISON OFFICER OR SUPERVISOR: Dr. T.G.Brydges

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

OBJECTIVE: To examine existing conditions in several highly enriched water bodies and then study the effects of reduced phosphorus loading through P - control at local sewage treatment plants.

DESCRIPTION:
(1) Penetang-Midland and Sturgeon Bay
- 11 sites sampled bi-weekly from May to October
- P-removal implemented at 4 S.T.P's in 1975, new plant to discharge to Sturgeon Bay in 1982.

(2) Bay of Quinte
- 7 sites sampled weekly from May to October
- P-removal implemented at 6 S.T.P's by 1977.

(3) Gravenhurst
- 1 site sampled bi-weekly from May to November
- P-removal implemented at 1 S.T.P. in December 1971
- Plant effluent and receiving stream also sampled.

DURATION OF PROJECT: ——— YEARS
PRESENT YEAR IS: (1) 10th (2) 10th (3) 13th YEAR
REPORTING DATE: (1) 1981 (2) Annually (3) 1981

BUDGET:

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

SOURCE OF FUNDS:
REGULAR WORK PROGRAM (1) —
SPECIAL MINISTRY FUNDING —
JOINTLY FUNDED PROJECT (2) —
OTHER —

IS A REPORT ANTICIPATED?
(1) Complete report. (2) Update since 1975. (3) Update since 1976

PARTICIPATION BY OTHER MINISTRIES:
(2) Co-operative project with Ministry of Natural Resources, Canada Centre for Inland Waters Queens University and University of Guelph.

REMARKS:
(1) Ministry of Natural Resources Participates in Sturgeon Bay Study.

Ministry of the Environment
Ontario

WR-27

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: July 1981

PROJECT TITLE: TAXONOMY AND ECOLOGY OF PHYTOPLANKTON IN LAKE ACIDIFICATION, NEUTRALIZATION AND EUTROPHICATION STUDIES

KEY WORDS: Algae, Phytoplankton, Acidification, Eutrophication

PRINCIPLE INVESTIGATOR AND AFFILIATION: K.H. Nicholls, Limnology & Toxicity Section

LIAISON OFFICER OR SUPERVISOR: T.G.Brydges

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

OBJECTIVE:
To describe structure and function of phytoplankton communities (taxonomy and ecology) relative to lake acidity and lake trophic state

DESCRIPTION:
A. Muskoka-Haliburton
1) Five-year study of 20 lakes relating composition and biomass of phytoplankton to other ecosystem variables (e.g. lake morphometry, water chemistry, food chain components).
2) Comparison of phytoplankton communities of selected lakes in 1979-80 with early records published by G.M. Smith (1920).
3) Taxonomy of diatom frustules and Mallomonas scales in selected lake sediments (along with ^{210}Pb dating) to determine rate of lake acidification during past three centuries.

B. Great Lakes
1) Response of phytoplankton to P loading reductions and long term changes related to nutrient loading, hydrology and climate (Bay of Quinte, south Georgian Bay, nearshore Great Lakes).

DURATION OF PROJECT —— *YEARS* *PRESENT YEAR IS* 4 —— *YEAR* *REPORTING DATE* Significant findings reported as they arise

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT (evaluated each year)	*CURRENT YEAR* 50K	*TOTAL PROJECT*	*CURRENT YEAR* 3

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* 1. APIOS 2. Great Lakes

IS A REPORT ANTICIPATED? Several available, more in progress

PARTICIPATION BY OTHER MINISTRIES:
Ministry of Natural Resources, Dept. of Fisheries & Oceans, Queen's & Guelph Universities

REMARKS:

Ministry of the Environment
Ontario

WR-28

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: December 19, 1980

PROJECT TITLE:
Organic compounds in selected sewage treatment plant effluents and organic residues in exposed fish populations

KEY WORDS: final effluents; industrial organics; bioaccumulation in fish; sewage treatment plant

PRINCIPLE INVESTIGATOR AND AFFILIATION Toxicity Unit, Water Resources Branch
Ministry of the Environment

LIAISON OFFICER OR SUPERVISOR G. Craig

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

OBJECTIVE:
1) undertake literature review of relevant studies
2) identify and quantify organic compounds from selected sewage treatment plant effluents discharged to the Great Lakes from Ontario and establish an inventory of these contaminants
3) identify and quantify organic compound residues in resident fish populations affected by sewage treatment plant discharges

DESCRIPTION:
PHASE I - final effluents from 10 municipal sewage treatment plants will be collected for GC-MS analyses. Composite sampling techniques will be used to minimize major fluctuations in chemical composition of the effluent.

PHASE II - depending on the results obtained from Phase I, sewage treatment plants will be selected for further final effluent collections. Phase I result evaluations will also provide direction for selection of three sites for nearshore fish collections.

PHASE III - the final phase of the study will be devoted to result evaluations and report preparation. Estimates for compound loadings to the receiving waters will be prepared for each sewage treatment plant.

DURATION OF PROJECT — 3 — *YEARS* *PRESENT YEAR IS* — 3 — *YEAR* *REPORTING DATE* March 31, 1982

BUDGET:
$26,780 - EPS
$16,500 - MOE

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$43,280		1 year	

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

IS A REPORT ANTICIPATED?

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:
This project addresses the Great Lakes contaminant problems in identifying representative sources and loadings of organics and inorganic . The fish analyses will provide information on the impact of these sources on the aquatic biota. This study complements the St. Clair program designed to identify volatile & solvent extractable organics discharged by industry.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WR-29

BRANCH: Water Resources

DATE: August 1981

PROJECT TITLE:
Cornwall Field Study

KEY WORDS: Toxicity, Zinc, Industrial Effluents, Bioassays

PRINCIPLE INVESTIGATOR AND AFFILIATION: Toxicity Unit (John Munro, Trevor Pawson)

LIAISON OFFICER OR SUPERVISOR: J. Munro, G. Craig

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

OBJECTIVE:
1. To determine the toxicity of selected effluents in the S.E. Region.
2. To determine the effects of Courtauld's Canada effluents using flow through and static bioassays, avoidance, daphnia life cycle test and accumulation of toxic substances in fish.
3. To develop new methods and testing protocols.

DESCRIPTION:
1. 96-hr LC50 bioassays were conducted on 50 industrial samples collected from industries in the S.E. Region.
2. A mobile trailer was sited at the discharges from Courtaulds and effluent from the #6 and #4 sewers were continuously monitored in a flow-through diluter for 16 and 4 days. Other biological tests were conducted at the main mobile trailer at the Cornwall Water Treatment Plant.
3. Hatching test development with spottail shiners and avoidance chamber protocols were worked on at the main trailer site using Courtaulds effluents.

DURATION OF PROJECT: 1 YEARS — *PRESENT YEAR IS:* 1 YEAR — *REPORTING DATE:* January 1982

BUDGET:

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

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

WR-30

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources *DATE:* December 19, 1980

PROJECT TITLE: St. Clair River Industrial Organic Contaminants Survey

KEY WORDS: St. Clair River, organic contaminants

PRINCIPLE INVESTIGATOR AND AFFILIATION: Toxicity Unit, John Munro

LIAISON OFFICER OR SUPERVISOR: G. Craig

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

OBJECTIVE:

1. to determine the frequency of occurrence and magnitude of EPA priority pollutants (organic) in industrial discharges to the St. Clair River.
2. to determine the variation and loading of priority pollutants in 5 selected discharges.
3. to determine the efficiency of contaminant removal by a biological treatment plant with activated charcoal filters.

DESCRIPTION:

1. A total of 153 samples were collected from 13 different industries and 3 sewage treatment plants and analyzed for the EPA priority pollutants (organic).
2. Five final discharges were selected and weekly loadings of contaminants were measured for 6 continuous weeks.
3. A wastewater treatment facility at a petrochemical plant was intensively sampled with daily composite samples collected for ten consecutive days. Samples were analyzed for the EPA priority pollutants as well as conventional parameters.

N.B. The completion of this program has been delayed pending the analysis of the organic samples.

DURATION OF PROJECT: 3 *YEARS* *PRESENT YEAR IS:* 3 *YEAR* *REPORTING DATE:* March 3, 1982

BUDGET:

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

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WR-31

BRANCH: Water Resources

DATE: July 1981

PROJECT TITLE: THE TOXICITY OF SELECTED ORGANICS TO FISH BY INTRA-PERITONEAL INJECTION

KEY WORDS: Organics, toxicity, fish, injection, structure-activity.

PRINCIPLE INVESTIGATOR AND AFFILIATION: I. Smith

LIAISON OFFICER OR SUPERVISOR: G. Craig

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

OBJECTIVE:
To establish intra-peritoneal injections and structure-activity correlations, a screening test for organics. Correlations of compounds log octanol/water partition coefficient with aqueous toxicity and intra-peritoneal toxicity may yield a predictive equation for many classes of organic compounds.

DESCRIPTION:
Chemicals (chlorinated benzenes, phenols, hydrocarbons, methylated benzenes) dissolved into cod-liver oil will be injected into Rainbow trout (approximately 30-40 g) and mortality recorded after 96 hours. Probit analysis will yield and LD50 value which will be used in conjunction with log partitions coefficients and literature LC50 values to assess the viability of predicting LC50 values based on LD50 values, and if valid, a predictive equation will be formed. Ranking of chemicals in order of importance for future testing (in-depth) will be possible, as will establishing whether mixtures can be screened in a similar manner.

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

BUDGET:

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

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

IS A REPORT ANTICIPATED? Yes. Three reports, each covering 4 months work.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Hazardous
Funded by Contaminants Coordinator's Office

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WR-32

BRANCH: Water Resources

DATE: July, 1981

PROJECT TITLE: The effects of elevated levels of aluminum and manganese in combination with low pH on survival of early life developmental phases of fish

KEY WORDS: Aluminum, manganese, pH, toxicity, survival, embryo/alevin, Rainbow trout

PRINCIPLE INVESTIGATOR AND AFFILIATION: K. Holtze Environmental Contaminants Laboratory
J. Lee Toxicity Unit, Quality Protection Section

LIAISON OFFICER OR SUPERVISOR: C. Inniss/G. Craig

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

OBJECTIVE:

1. To determine the relative toxicity of aluminum/manganese at neutral and low pH
2. To determine tolerances of early developmental phases of fish to combined pH and metal stress

DESCRIPTION:

Selected growth phases within the embryonic and alevin developmental periods will be compared including (1) cleavage phase (2) embryonic phase (3) eleutheroembryonic phase and (4) alevin phase. Metal concentrations ranging from 100 to 1000 µg/l will be tested at neutral (pH 7.2) and depressed pH levels (6.5, 5.5, 4.5). Tests will be conducted in artificially softened water (total hardness 15 mg/l as $CaCO_3$) under renewed-static conditions at 10°C. Biological parameters to be examined include (1) development (2) hatching success and (3) survival of emergent alevins.

DURATION OF PROJECT: 2 YEARS

PRESENT YEAR IS: 2nd YEAR

REPORTING DATE: 1) October 1981 2) March 1982

BUDGET: 1980 25,000 1981 30,000

TOTAL DOLLARS: TOTAL PROJECT, CURRENT YEAR

MAN YEARS: TOTAL PROJECT 5, CURRENT YEAR 3

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

None

REMARKS:

Aluminum and pH exposures have been completed using hatchery reared fall spawns (October 1980). Manganese and pH exposures will be completed using hatchery reared fall spawns obtained in October 1981.
Funded by APIOS

Ministry of the Environment
Ontario

WR-33

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: July 20, 1981

PROJECT TITLE:
FACTORS AFFECTING ALUMINUM TOXICITY TO FISH AT LOW pH

KEY WORDS: Aluminum, pH, toxicity, water chemistry.

PRINCIPLE INVESTIGATOR AND AFFILIATION	K. Holtze J. Lee	Environmental Contaminants Laboratory, Toxicity Unit, Quality Protection Section
LIAISON OFFICER OR SUPERVISOR	C. Inniss/G. Craig	

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

OBJECTIVE:
To determine the effects of specific chemical factors on aluminum toxicity to fish at low pH including (1)ameliorative effects of Ca^{2+}, Mg^{2+}, Na^{+}, Cl^{+} and (2) antagonistic effects of organic ligards.

To determine the effects of combined acid/metal stress on (1) electrolyte regulation and (2) oxygen uptake in fish.

DESCRIPTION:
Rainbow trout alevins will be exposed to elevated levels of aluminum (50 to 400 µg/l) in combination with lethal pH (4.0) and sublethal levels of pH (6.5, 5.5, 4.5). Each exposure series will be replicated in hard (total hardness 135 mg/l as $CaCO_3$) and artificially softened waters (total hardness 50 and 15 mg/l as $CaCO_3$).
Biological parameters to be measured include (1) whole body electrolyte levels and (2) gill pathology.

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

BUDGET:	*TOTAL DOLLARS*		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
1981 $170,000			4	4

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:
Funded by A.P.I.O.S.

Ministry of the Environment
Ontario

WR-34

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: July 1981

PROJECT TITLE: NEARSHORE FISH CONTAMINANTS SURVEILLANCE - GREAT LAKES

KEY WORDS: Organochlorine residues, mercury, lead, young-of-the-year spottail shiners, contaminant trends, concentrations.

PRINCIPLE INVESTIGATOR AND AFFILIATION: K. Suns - Toxicity Unit, MOE

LIAISON OFFICER OR SUPERVISOR: G.R.Craig

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

OBJECTIVE:
- identify problem areas for point-source investigations.
- develop data base for temporal contaminant trend assessment.

DESCRIPTION:
The program attempts to identify the geographic distribution and monitor temporal trends of persistent contaminants in the nearshore zones of the Great Lakes. Young-of-the-year spottail shiners are used as bio-integrators for contaminant level determinations. In addition to regular monitoring new compounds with bio-accumulative characteristics are investigated, as analytical support becomes available. Fish collections are made annually.

DURATION OF PROJECT: multi-year YEARS
PRESENT YEAR IS: 6th YEAR
REPORTING DATE: Annually

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$225,000	$40,000	6	

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

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: None

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WR-35

BRANCH: Water Resources

DATE: July 1981

PROJECT TITLE:
AQUATIC TOXICITY STUDIES OF MULTIPLE ORGANIC COMPOUNDS

KEY WORDS: Chlorinated organic compounds, Hazard assessment, Fish Toxicity, Sublethal Effects, Reproduction, Bioaccumulation

PRINCIPLE INVESTIGATOR AND AFFILIATION: Dr. G.W. Ozburn & Dr. D. Orr, Lakehead University

LIAISON OFFICER OR SUPERVISOR: G.R. Craig, Head-Toxicity Unit, M.O.E.

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

OBJECTIVE:
To determine the lethal and sublethal concentrations to fish of single industrial organic compounds and mixtures in water.

DESCRIPTION:
Candidate organic compounds are selected by a steering committee composed of representatives from EPS, Ontario Region; Contaminants Coordinators Office; MOE regional office; NRC; EPA-Duluth, and the MOE Toxicity Unit. Compounds will be injected into water, concentrations measured and exposed to flagfish during egg production, hatching and fry life stages. Comparable exposures will be completed on brook trout eggs and fry when stocks are available. Levels of compounds in fish will also be measured to determine rates of accumulation. Mixtures of compounds will also be tested to determine interactions.

Response data will be used to develop industrial discharge guidelines.

DURATION OF PROJECT: 3 YEARS *PRESENT YEAR IS* 1 YEAR *REPORTING DATE:* March 82, 83,84

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$344,810	$108,327	12	4

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

IS A REPORT ANTICIPATED? Reports on each compound/mixture will be prepared

PARTICIPATION BY OTHER MINISTRIES:
None

REMARKS: This project is jointly funded:

MOE Provincial Lottery	$53,327
MOE Hazardous Contaminants	$15,000
Environment Canada	$40,000
	$108,327

Ministry of the Environment
Ontario

WR-36

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources *DATE:* July 1981

PROJECT TITLE: The Biological and Chemical Evaluations of Industrial Effluents and their Receiving Waters.

KEY WORDS: Industrial effluents, toxicity bioassays, lethality, reproduction, egg hatchability, rainbow trout, daphnia, zebrafish.

PRINCIPLE INVESTIGATOR AND AFFILIATION K. Flood, Industrial/Contaminants Evaluation Laboratory
M. Thomson, Toxicity Unit, Quality Protection Section

LIAISON OFFICER OR SUPERVISOR J. Munro/G. Craig

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

OBJECTIVE:

1. to determine specific toxic components in an effluent of concern;
2. to treat effluents to alter individual components (BOD, pH, DIC and DOC, NH_3, chlorine, etc.) and to relate biologically measurable changes to the chemical alterations and treatments.
3. to assess the aquatic effects of potentially hazardous compounds;
4. to evaluate testing protocols and new methods;
5. to test the toxicity of effluents across an industrial sector for use in the setting of federal regulations and guidelines.

DESCRIPTION:

CURRENT PROJECTS

1. Penmans (Dominion Textiles) - Paris. To determine the toxicological effects of a textile mill effluent upon a STP effluent.
2. Amerock, Meaford. To measure the degree of toxicity from a plating waste and determine its specific toxic components.
3. Four Mile Creek, North Bay. To evaluate the effects (lethality, fish avoidance) of a train spill upon a receiving water which could potentially support fish.
4. Serpent River, Elliot Lake. To evaluate a stretch of river receiving mine tailings effluent in regard to its suitability to support a fishery (joint project - N.E. Region, Water Modelling, Toxicity Unit).
5. Uniroyal, Elmira. To identify chlorinated phenols and pesticides, etc., which are bioaccumulated from a chemical plant and STP effluent by Rainbow Trout (joint work - CCIW and Toxicity Unit).

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

BUDGET:

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

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

IS A REPORT ANTICIPATED?

PARTICIPATION BY OTHER MINISTRIES:

MNR supplied fish for insitu exposures in the Serpent River study.

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