WORKING PAPER

Scientific and Technological Resources Division

Scientific and Technological Activities
and Resources Information Group

Inventory of Federal Scientific Establishments

April, 1974

Ministry of State
Science and
Technology

Ministère d'État
Sciences et
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FOREWORD

This inventory provides statistical and descriptive information on the activities and resources of federal establishments engaged in natural science activities across Canada. Statistical data are presented by province, by location within each province, by department or agency total and by departmental program. For each province, the descriptions of the activities of scientific establishments associated with the various departments and agencies are listed.

The statistical information was compiled by STARI from questionnaires received by Statistics Canada in March, 1973, from federal departments and agencies. Descriptions of the activities of establishments are based mostly on annual reports and departmental publications; telephone enquiries were made only when other sources failed to uncover the desired information.

This inventory is a working document and should not be considered as published material.

CONTENTS

INTRODUCTION

This Inventory of Federal Scientific Establishments is divided into two parts. The first, printed on white pages, consists of four statistical tables detailing the manpower and financial resources of federal establishments engaged in natural science activities: Table 1 is a provincial summary of total manpower and expenditure levels for all departments and agencies; Table 2, Section A presents manpower data by department and province while Section B provides similar expenditure information; Table 3 lists, for each province or region, the manpower and expenditures of each scientific establishment for each departmental program, the total provincial manpower and expenditure level. Conversely, table 4 lists for a given department the provincial totals for these same resources.

Part two, printed on yellow pages, provides, on a provincial basis, brief descriptions of the activities of the scientific establishments of all departments and agencies.

A common sequence of numbers is used to identify departments and agencies; they are as follows:

1. Agriculture
2. Atomic Energy of Canada Limited
3. Canadian Arsenals Limited
4. Canadian Broadcasting Corporation
5. Canadian Patents and Development Limited
6. Central Mortgage and Housing Corporation
7. Communications
8. Consumer and Corporate Affairs
9. Energy, Mines and Resources
10. Environment
11. External Affairs
12. Health and Welfare
13. Indian and Northern Affairs
14. Industry, Trade and Commerce
15. International Development Research Centre
16. Medical Research Council
17. National Defence
18. National Film Board
19. National Museums
20. National Research Council
21. Post Office
22. Public Works
23. Regional Economic Expansion
24. St. Lawrence Seaway Authority
25. Transport
26. Veterans Affairs

All expenditure data include the non-program or "indirect costs" of scientific activities, that is, the value of services provided by other departments, accommodation provided by the reporting agency, and administration program costs attributable to scientific activities; these apply to the intramural activities of departments and agencies on which this inventory concentrates solely. The expenditures and manpower reported for each scientific establishment are as reported by the department or agency to Statistics Canada in the annual survey of federal scientific activities in the natural sciences. The costs of administering extramural scientific programs are included. Expenditure data cover the federal government fiscal year beginning April 1, 1972 and ending March 31, 1973.

Information on manpower is expressed in full-time equivalent and includes continuing, term, casual and seasonal employees as well as military personnel, as of September 30, 1972.

Mr. G. O'Brien is responsible for the preparation of this Inventory. Mr. P. Gard assisted him in assembling information on scientific activities conducted in the National Capital Region.

We would invite the expression of your views on this document.

ABBREVIATIONS

AECL	Atomic Energy of Canada Limited
CAL	Canadian Arsenals Limited
CBC	Canadian Broadcasting Corporation
CPDL	Canadian Patents and Development Limited
CMHC	Central Mortgage and Housing Corporation
CCA	Consumer and Corporate Affairs
EMR	Energy, Mines and Resources
INA	Indian and Northern Affairs
ITC	Industry, Trade and Commerce
IDRC	Industrial Research Development Centre
MRC	Medical Research Council
DND	Department of National Defence
NFB	National Film Board
NRC	National Research Council
REE	Regional Economic Expansion
SLSA	Saint Lawrence Seaway Authority

PART ONE

TABLE 1

Federal Scientific Establishments
Natural Sciences, 1973

PROVINCE OR REGION	Manpower				Expenditures ($ 000)			
	Scientific & Professional	Others	*Total*	% of Grand Total	Current	Capital	*Total*	% of Grand Total
British Columbia	471.5	1,311.4	*1,782.9*	(6.8)	33,792	3,738	*37,530*	(6.1)
Prairie Provinces	909.3	2,978.4	*3,887.7*	(14.8)	78,248	8,656	*86,904*	(14.2)
Alberta	377.0	1,574.0	*1,951.0*	(7.5)	36,412	3,983	*40,395*	(6.6)
Saskatchewan	161.2	403.7	*564.9*	(2.2)	9,154	679	*9,833*	(1.6)
Manitoba	371.1	1,000.7	*1,371.8*	(5.2)	32,682	3,994	*36,676*	(6.0)
N.W.T. & Yukon	10.0	40.0	*50.0*	(0.2)	1,766	257	*2,023*	(0.3)
Ontario (excluding Ottawa)	1,265.6	3,578.5	*4,844.1*	(18.5)	114,764	12,354	*127,118*	(20.8)
National Capital Region	3,084.5	7,555.5	*10,640.0*	(40.6)	216,205	40,875	*257,080*	(42.0)
Quebec (excluding Hull)	337.4	1,863.5	*2,200.9*	(8.4)	34,775	2,093	*36,868*	(6.0)
Atlantic Provinces	579.5	1,912.7	*2,492.2*	(9.5)	44,341	4,705	*49,046*	(8.0)
New Brunswick	177.0	569.0	*746.0*	(2.8)	9,989	728	*10,717*	(1.8)
Nova Scotia	326.5	1,103.7	*1,430.2*	(5.5)	28,326	3,589	*31,915*	(5.2)
P. E. I.	18.0	76.0	*94.0*	(0.4)	1,224	36	*1,260*	(0.2)
Newfoundland	58.0	164.0	*222.0*	(0.8)	4,802	352	*5,154*	(0.8)
Unallocated	102.0	182.0	*284.0*	(1.1)	9,931	5,510	*15,441*	(2.5)
TOTAL	*6,579.8*	*19,422.0*	*26,181.8*	*(100.0)*	*533,822*	*78,188*	*612,010*	*(100.0)*

TABLE 2 A

Federal Manpower Engaged in Scientific Activities
Natural Sciences, 1972-73[1]
By Department or Agency

Department or Agency*	B.C.	Yukon & N.W.T.	Alberta	Sask.	Man.	Ont.[2]	National Capital Region	Quebec[3]	N.B.	N.S.	P.E.I.	NFLD.	UNALLO-CATED	TOTAL	% of Grand Total
Agriculture	299.0	-	495.0	393.0	334.0	373.5	1,452.0	300.0	145.5	154.0	94.0	38.0	-	4,078.0	(15.6)
AECL	-	-	-	-	511.0	1,894.0	104.0	-	-	-	-	-	-	2,509.0	(9.6)
CAL	-	-	-	-	-	-	-	5.5	-	-	-	-	-	5.5	(- -)
CBC	-	-	-	-	-	-	-	6.0	-	-	-	-	-	6.0	(- -)
CPDL	-	-	-	-	-	-	25.0	-	-	-	-	-	-	25.0	(0.1)
CMHC	-	-	-	-	-	-	0.7	-	-	-	-	-	-	0.7	(- -)
Communications	-	-	-	-	-	-	531.0	-	-	-	-	-	-	531.0	(2.0)
CCA	-	-	-	-	-	-	449.5	-	-	-	-	-	-	449.5	(1.7)
EMR	45.0	10.0	175.0	-	-	26.0	2,090.0	3.0	-	80.0	-	-	257.0	2,686.0	(10.3)
Environment	1,214.0	26.0	655.0	59.0	514.0	2,083.0	1,394.0	412.0	600.5	868.7	-	184.0	25.0	8,035.2	(30.7)
External Affairs	-	-	-	-	-	-	4.0	-	-	-	-	-	-	4.0	(- -)
Health & Welfare	-	3.0	-	-	-	-	527.9	-	-	-	-	-	2.0	532.9	(2.0)
INA	-	11.0	-	-	-	-	7.0	-	-	-	-	-	-	18.0	(0.1)
ITC	-	-	-	-	-	-	131.0	-	-	-	-	-	-	131.0	(0.5)
IDRC	-	-	-	-	-	-	63.0	-	-	-	-	-	-	63.0	(0.2)
MRC	-	-	-	-	-	-	27.0	-	-	-	-	-	-	27.0	(0.1)
DND	142.0	-	626.0	-	-	433.0	773.0	1,278.0	-	248.0	-	-	-	3,500.0	(13.4)
NFB	-	-	-	-	-	-	-	12.0	-	-		-	-	12.0	(- -)
National Museums	-	-	-	-	-	-	112.0	-	-	-	-	-	-	112.0	(0.4)
NRC	73.4	-	-	99.9	9.5	29.9	2,682.7	7.6	-	76.8	-	-	-	2,979.8	(11.4)
Post Office	-	-	-	-	-	-	25.3	-	-	-	-	-	-	25.3	(0.1)
Public Works	-	-	-	-	-	1.5	96.0	118.0	-	-	-	-	-	215.5	(0.8)
REE	-	-	-	13.0	-	-	-	-	-	-	-	-	-	13.0	(- -)
SLSA	-	-	-	-	-	2.0	10.0	8.5	-	-	-	-	-	20.5	(0.1)
Transport	-	-	-	-	-	-	134.9	43.0	-	-	-	-	-	177.9	(0.7)
Veterans Affairs	9.5	-	-	-	3.3	1.2	-	7.3	-	2.7	-	-	-	24.0	(0.1)
TOTAL	1,782.9	50.0	1,951.0	564.9	1,371.8	4,844.1	10,640.0	2,200.9	746.0	1,430.2	94.0	222.0	284.0	26,181.8	(100.0)

1 Expressed in full-time equivalent. The total includes continuing employees on strength as of September 30, 1972, as well as term, casual and seasonal employees for 1972-73.

2 Excluding Ottawa

3 Excluding Hull

* See list of abbreviations.

TABLE 2 B

Federal Intramural Expenditures on Scientific Activities
Natural Sciences, 1972-73
By Department or Agency
($000)

Department or Agency*	British Columbia	Yukon & N. W. T.	Alberta	Sask.	Man.	Ont.[1]	National Capital Region	Quebec[2]	N. B.	N. S.	P. E. I.	Newfoundland	Unallo-cated	TOTAL	% of Grand Total
Agriculture	4,845	-	8,105	5,632	6,201	6,569	20,894	4,211	2,064	2,206	1,260	536	7,511	70,034	(11.4)
AECL	-	-	-	-	15,731	45,192	5,418	-	-	-	-	-	-	66,341	(10.8)
CAL	-	-	-	-	-	-	-	106	-	-	-	-	-	106	(-)
CBC	-	-	-	-	-	-	-	115	-	-	-	-	-	115	(-)
CPDL	-	-	-	-	-	-	612	-	-	-	-	-	-	612	(0.1)
CMHC	-	-	-	-	-	-	6	-	-	-	-	-	--	6	(-)
Communications	-	-	-	-	-	-	23,362	-	-	-	-	-	--	23,362	(3.8)
CCA	-	-	-	-	-	-	8,816	-	-	-	-	-	--	8,816	(1.4)
EMR	1,117	539	5,325	768	32	590	51,009	116	6	2,451	-	20	5,311	67,284	(11.0)
Environment	25,706	928	13,497	1,380	13,248	64,168	38,452	8,847	8,643	19,684	-	4,598	2,600	201,751	(33.0)
External Aff.	-	-	-	-	-	-	225	-	-	-	-	-	-	225	(-)
Health & Welfare	34	350	33	33	17	-	11,057	-	-	-	-	-	-	11,524	(1.9)
INA	-	206	-	-	-	-	432	-	-	-	-	-	-	638	(0.1)
ITC	-	-	-	-	-	-	2,237	-	-	-	-	-	-	2,237	(0.4)
IDRC	-	-	-	-	-	-	1,503	-	-	-	-	-	-	1,503	(0.2)
MRC	-	-	-	-	-	-	735	-	-	-	-	-	-	735	(0.1)
Natl. Defence	4,100	-	13,435	-	-	9,870	18,040	20,796	-	5,824	-	-	-	72,065	(11.8)
NFB	-	-	-	-	-	-	-	369	-	-	-	-	-	369	(0.1)
Natl. Museums	-	-	-	-	-	-	3,013	-	-	-	-	-	-	3,013	(0.5)
NRC	1,669	-		1,868	1,410	506	64,330	206	-	1,727	-	-	-	71,716	(11.7)
Post Office	-	-	-	-	-	-	767	-	-	-	-	-	-	767	(0.1)
Public Works	-	-	-	-	-	25	1,765	536	-	-	-	-	-	2,326	(0.4)
REE	-	-	-	152	-	-	-	-	-	-	-	-	-	152	(-)
SLSA	-	-	-	-	-	190	-	354	-	-	-	-	-	544	(0.1)
Transport	-	-	-	-	-	-	4,407	1,127	4	-	-	-	-	5,538	(0.9)
V.A.	59	-	-	-	37	8	-	85	-	23	-	-	19	231	(-)
TOTAL	37,530	2,023	40,395	9,883	36,676	127,118	257,080	36,868	10,717	31,915	1,260	5,154	15,441	612,010	(100.0)

[1] Excluding Ottawa

[2] Excluding Hull

* See list of abbreviations.

TABLE 3 Federal Scientific Establishments, Natural Sciences
By Department or Agency, 1973

Federal Scientific Establishments in British Columbia
Manpower and Expenditures
By Department or Agency, 1973

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
AGRICULTURE - TOTAL	73.0	226.0	*299.0*	4,626	219	*4,845*
Research	71.0	222.0	*293.0*	4,528	217	*4,745*
Agassiz	11.0	55.0	*66.0*	972	25	*997*
Kamloops	4.0	26.0	*30.0*	447	16	*463*
Sidney	5.0	25.0	*30.0*	403	4	*407*
Summerland	27.0	86.0	*113.0*	1,740	55	*1,795*
Vancouver	24.0	30.0	*54.0*	966	117	*1,083*
Health of Animals	2.0	4.0	*6.0*	98	2	*100*
Vancouver	2.0	4.0	*6.0*	98	2	*100*
ENERGY, MINES & RESOURCES - TOTAL	29.0	16.0	*45.0*	1,054	63	*1,117*
Mineral and Energy Resources	29.0	16.0	*45.0*	874	27	*901*
Vancouver	29.0	16.0	*45.0*	874	27	*901*
Earth Sciences	-	-	-	180	36	*216*
Victoria	-	-	-	136	36	*172*
Seismological Network	-	-	-	44	-	*44*
ENVIRONMENT-TOTAL	296.0	918.0	*1,214.0*	22,891	2,815	*25,706*
Fisheries and Marine	108.0	432.0	*540.0*	11,524	1,577	*13,101*
Nanaimo	47.0	150.0	*197.0*	4,076	282	*4,358*
West Vancouver	5.0	12.0	*17.0*	539	578	*1,117*
Vancouver	56.0	270.0	*326.0*	1,231	115	*1,346*
Victoria	-			5,678	602	*6,280*
Environmental Services	188.0	486.0	*674.0*	11,367	1,238	*12,605*
(Atmospheric Environment)	31.0	163.0	*194.0*	3,365	277	*3,642*
Vancouver	31.0	163.0	*194.0*	3,365	277	*3,642*

Federal Scientific Establishments in British Columbia
Manpower and Expenditures
By Department or Agency, 1973

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
ENVIRONMENT - Cont'd						
Environmental Services (cont'd)						
(Environmental Management)	157.0	323.0	*480.0*	8,002	961	*8,963*
Vancouver	92.0	169.0	*261.0*	5,046	715	*5,761*
Victoria	65.0	154.0	*219.0*	2,956	236	*3,192*
Waseauxlake	-	-	-	-	10	*10*
HEALTH & WELFARE	-	-	-	34	-	*34*
NATIONAL DEFENCE - TOTAL	37.0	105.0	*142.0*	3,821	279	*4,100*
Defence Services	1.0	29.0	*30.0*	968	19	*987*
Nanoose	1.0	29.0	*30.0*	968	19	*987*
Defence Research Board	36.0	76.0	*112.0*	2,853	260	*3,113*
Esquimault	36.0	76.0	*112.0*	2,853	260	*3,113*
NATIONAL RESEARCH COUNCIL	35.0	38.4	*73.4*	1,307	362	*1,669*
Victoria	18.2	23.9	*42.1*	735	276	*1,011*
Penticton	9.5	8.5	*18.0*	327	57	*384*
Vancouver	7.3	5.0	*12.3*	212	29	*241*
Roger's Pass	-	1.0	*1.0*	33	-	*33*
VETERANS AFFAIRS	1.5	8.0	*9.5*	59	-	*59*
Vancouver	1.5	8.0	*9.5*	59	-	*59*
TOTAL	*471.5*	*1,311.4*	*1,782.9*	*33,792*	*3,728*	*37,530*

Federal Scientific Establishments in Yukon & N.W.T.
Manpower and Expenditures
By Department or Agency, 1973.

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
ENERGY, MINES & RESOURCES - TOTAL	-	10.0	*10.0*	371	168	*539*
Earth Sciences	-	10.0	*10.0*	371	168	*539*
Artic	-	10.0	*10.0*	-	-	-
Yellowknife	-	-		128	160	*288*
Yukon	-	-		6	-	*6*
N.W.T.	-	-		237	8	*245*
ENVIRONMENT - TOTAL	5.0	21.0	*26.0*	854	74	*928*
Environmental Services	5.0	21.0	*26.0*	854	74	*928*
(Environmental Management)	5.0	21.0	*26.0*	854	74	*928*
Whitehorse	1.0	8.0	*9.0*	194	40	*234*
Fort Smith	2.0	13.0	*15.0*	523	30	*553*
Inuvik	2.0	-	*2.0*	-	-	-
West Artic		-		137	4	*141*
INDIAN AND NORTHERN AFFAIRS	4.0	7.0	*11.0*	191	15	*206*
Inuvik	1.0	5.0	*6.0*	191	15	*206*
Yellowknife	2.0	1.0	*3.0*	-	-	-
Whitehorse	1.0	1.0	*2.0*	-	-	-
NATIONAL HEALTH & WELFARE - TOTAL	1.0	2.0	*3.0*	350	-	*350*
Medical Services	1.0	2.0	*3.0*	350	-	*350*
Northwest Territories	1.0	2.0	*3.0*	350	-	*350*
TOTAL	*10.0*	*40.0*	*50.0*	*1,766*	*257*	*2,023*

Federal Scientific Establishments in Alberta
Manpower and Expenditures
By Department or Agency, 1973.

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
AGRICULTURE - TOTAL	98.0	397.0	*495.0*	7,177	928	*8,105*
Research	95.0	377.0	*472.0*	6,782	911	*7,693*
Beaverlodge	13.0	51.0	*64.0*	849	36	*885*
Fort Vermilion	1.0	11.0	*12.0*	142	-	*142*
Prince George	2.0	19.0	*21.0*	257	-	*257*
Lacombe	15.0	77.0	*92.0*	1,409	40	*1,449*
Lethbridge	64.0	219.0	*283.0*	4,125	835	*4,960*
Health of Animals	3.0	20.0	*23.0*	395	17	*412*
Lethbridge	3.0	20.0	*23.0*	395	17	*412*
ENERGY, MINES & RESOURCES - TOTAL	92.0	83.0	*175.0*	4,339	986	*5,325*
Mineral and Energy Resources	77.0	71.0	*148.0*	3,640	986	*4,626*
Edmonton	1.0	6.0	*7.0*	129	98	*227*
Calgary	76.0	65.0	*141.0*	3,511	888	*4,399*
Earth Sciences	15.0	12.0	*27.0*	699	-	*699*
Calgary	15.0	12.0	*27.0*	607	-	*607*
Seismologitol Network	-	-	-	92	-	*92*
ENVIRONMENT - TOTAL	150.0	505.0	*655.0*	12,531	966	*13,497*
Environmental Services	150.0	505.0	*655.0*	12,531	966	*13,497*
(Environmental Protection)	3.0	-	*3.0*	50	183	*233*
Edmonton	3.0	-	*3.0*	50	183	*233*
(Atmospheric Environment)	49.0	243.0	*292.0*	4,607	308	*4,915*
Edmonton	49.0	243.0	*292.0*	4,607	308	*4,915*

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
(Environmental Management)	98.0	262.0	*360.0*	7,874	475	*8,349*
Calgary	20.0	65.0	*85.0*	1,308	179	*1,487*
Edmonton	78.0	197.0	*275.0*	6,566	296	*6,862*
HEALTH & WELFARE - TOTAL	-	-	-	33	-	*33*
Medical Services	-	-	-	33	-	*33*
NATIONAL DEFENCE - TOTAL	37.0	589.0	*626.0*	12,332	1,103	*13,435*
Defence Services	4.0	423.0	*427.0*	8,332	795	*9,127*
Medley	4.0	372.0	*376.0*	6,980	795	*7,775*
Edmonton	-	51.0	*51.0*	1,352	-	*1,352*
Defence Research Board	33.0	166.0	*199.0*	4,000	308	*4,308*
Ralston	33.0	166.0	*199.0*	4,000	308	*4,308*
TOTAL	*377.0*	*1,574.0*	*1,951.0*	*36,412*	*3,983*	*40,395*

Federal Scientific Establishments in Saskatchewan
Manpower and Expenditures
By Department or Agency, 1973

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
AGRICULTURE - TOTAL	102.0	291.0	*393.0*	5,365	267	*5,632*
Research	101.0	289.0	*390.0*	5,326 37	264	*5,590*
Indian Head	2.0	28.0	*30.0*	375	7	*682*
Melfort	8.0	41.0	*49.0*	612	35	*647*
Regina	16.0	26.0	*42.0*	532	46	*578*
Saskatchewan	46.0	84.0	*130.0*	1,887	104	*1,991*
Swift Current	29.0	110.0	*139.0*	1,920	72	*1,992*
Health of Animals	1.0	2.0	*3.0*	39	3	*42*
Saskatoon	1.0	2.0	*3.0*	39	3	*42*
ENERGY, MINES & RESOURCES - TOTAL	-	-	-	621	147	*768*
Earth Sciences	-	-	-	621	147	*768*
Prince Albert	-	-	-	602	147	*749*
Seismological Network	-	-	-	19	-	*19*
ENVIRONMENT - TOTAL	17.0	42.0	*59.0*	1,190	190	*1,380*
Environmental Services	17.0	42.0	*59.0*	1,190	190	*1,380*
(Environmental Management)	17.0	42.0	*59.0*	1,190	190	*1,380*
Regina	9.0	35.0	*44.0*	778	169	*947*
Saskatoon	7.0	6.0	*13.0*	412	21	*433*
Lost Mountain Lake	1.0	1.0	*2.0*	-	-	-
HEALTH & WELFARE - TOTAL	-	-	-	33	-	*33*
Medical Services	-	-	-	33	-	*33*

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
NATIONAL RESEARCH COUNCIL	38.2	61.7	*99.9*	1,793	75	*1,868*
Saskatoon	38.2	61.7	*99.9*	1,793	75	*1,868*
REGIONAL ECONOMIC EXPANSION	4.0	9.0	*13.0*	152	-	*152*
Regina	4.0	9.0	*13.0*	152	-	*152*
TOTAL	*161.2*	*403.7*	*564.9*	*9,154*	*679*	*9,833*

Federal Scientific Establishments in Manitoba
Manpower and Expenditures
By Department or Agency, 1973

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
AGRICULTURE - TOTAL	87.1	246.9	*334.0*	5,662	539	*6,201*
Research	72.0	189.0	*261.0*	3,781	138	*3,919*
Brandon	14.0	63.0	*77.0*	1,198	44	*1,242*
Morden	17.0	51.0	*68.0*	787	20	*807*
Winnipeg	41.0	75.0	*116.0*	1,796	74	*1,870*
Health of Animals	0.5	1.5	*2.0*	20	1	*21*
Winnipeg	0.5	1.5	*2.0*	20	1	*21*
Canadian Grain Commission	14.6	56.4	*71.0*	1,861	400	*2,261*
Winnipeg	14.6	56.4	*71.0*	1,861	400	*2,261*
ATOMIC ENERGY OF CANADA LIMITED	141.0	370.0	*511.0*	14,346	1,385	*15,731*
Pinawa	141.0	370.0	*511.0*	14,346	1,385	*15,731*
ENERGY, MINES & RESOURCES - TOTAL	-	-	-	32	-	*32*
Earth Sciences	-	-	-	32	-	*32*
Seismological Network	-	-	-	32	-	*32*
ENVIRONMENT - TOTAL	136.0	378.0	*514.0*	11,178	2,070	*13,248*
Fisheries & Marine	75.0	72.0	*147.0*	3,798	941	*4,739*
Winnipeg	75.0	72.0	*147.0*	3,798	941	*4,739*
Environmental Services	61.0	306.0	*367.0*	7,380	1,129	*8,509*
(Atmospheric Environment)	48.0	260.0	*308.0*	6,296	974	*7,270*
Winnipeg	48.0	260.0	*308.0*	6,296	974	*7,270*

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
(Environmental Management)	13.0	46.0	*59.0*	1,084	155	*1,239*
Winnipeg	13.0	46.0	*59.0*	1,084	155	*1,239*
NATIONAL HEALTH & WELFARE - TOTAL	-	-	-	17	-	*17*
Medical Services	-	-	-	17	-	*17*
Winnipeg	-	-	-	17	-	*17*
NATIONAL RESEARCH COUNCIL	5.5	4.0	*9.5*	1,410	-	*1,410*
Fort Churchill	2.3	2.0	*4.3*	1,305	-	*1,305*
Thompson	-	1.0	*1.0*	34	-	*34*
Winnipeg	3.2	1.0	*4.2*	71	-	*71*
VETERANS AFFAIRS	1.5	1.8	*3.3*	37	-	*37*
Winnipeg	1.5	1.8	*3.3*	37	-	*37*
TOTAL	*371.1*	*1,000.7*	*1,371.8*	*32,682*	*3,994*	*36,676*

Federal Scientific Establishments in Ontario, excluding Ottawa
Manpower and Expenditures
By Department or Agency, 1973.

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
AGRICULTURE - TOTAL	96.5	277.0	*373.5*	6,323	246	*6,569*
Research	95.0	273.0	*368.0*	6,263	243	*6,506*
London	27.0	55.0	*82.0*	1,322	75	*1,397*
Belleville	-	-	-	965	-	*965*
Kapuskasing	1.0	27.0	*28.0*	348	15	*363*
Smithfield	6.0	23.0	*29.0*	327	15	*342*
Thunder Bay	1.0	5.0	*6.0*	75	5	*80*
Harrow	32.0	88.0	*120.0*	1,721	60	*1,781*
Vineland	19.0	40.0	*59.0*	932	35	*967*
Delhi	9.0	35.0	*44.0*	573	38	*611*
Health of Animals	1.5	4.0	*5.5*	60	3	*63*
Guelph	1.5	4.0	*5.5*	60	3	*63*
ATOMIC ENERGY OF CANADA LIMITED	479.0	1,415.0	*1,894.0*	41,940	3,252	*45,192*
Chalk River	450.0	1,268.0	*1,718.0*	38,534	3,102	*41,636*
Sheridan Park	29.0	147.0	*176.0*	3,406	150	*3,556*
ENERGY, MINES & RESOURCES - TOTAL	12.0	14.0	*26.0*	527	63	*590*
Mineral and Energy Resources	6.0	10.0	*16.0*	508	63	*571*
Eliot Lake	6.0	10.0	*16.0*	508	63	*571*
Earth Sciences	6.0	4.0	*10.0*	19	-	*19*
ENVIRONMENT - TOTAL	636.0	1,447.0	*2,083.0*	55,621	8,547	*64,168*
Fisheries & Marine	4.0	150.0	*154.0*	3,736	275	*4,011*
Burlington	4.0	150.0	*154.0*	3,736	275	*4,011*
Environmental Services	632.0	1,297.0	*1,929.0*	51,885.	8,272	*60,157*
(Environmental Protection)	6.0	24.0	*30.0*	1,228	1,668	*2,896*
Burlington	6.0	24.0	*30.0*	1,228	1,668	*2,896*

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
(Atmospheric Environment)	448.0	822.0	*1,270.0*	38,211	3,203	*41,414*
Toronto	448.0	822.0	*1,270.0*	38,211	3,203	*41,414*
(Environmental Management)	178.0	451.0	*629.0*	12,446	3,401	*15,847*
Sault St. Marie	50.0	132.0	*182.0*	2,687	535	*3,222*
Chalk River	15.0	55.0	*70.0*	1,343	85	*1,428*
Midland	2.0	5.0	*7.0*	136	20	*156*
Aurora	4.0	5.0	*9.0*	151	11	*162*
Burlington	98.0	210.0	*308.0*	7,222	2,635	*9,857*
Guelph	9.0	44.0	*53.0*	907	115	*1,022*
IATIONAL DEFENCE - TOTAL	35.0	398.0	*433.0*	9,624	246	*9,870*
Defence Services	-	280.0	*280.0*	7,124	-	*7,124*
Toronto	-	280.0	*280.0*	7,124	-	*7,124*
Defence Research Board	35.0	118.0	*153.0*	2,500	246	*2,746*
Downsview	35.0	118.0	*153.0*	2,500	246	*2,746*
ATIONAL RESEARCH COUNCIL	3.4	26.5	*29.9*	506	-	*506*
Lake Traverse	1.0	23.5	*24.5*	401	-	*401*
Toronto	2.4	3.0	*5.4*	105	-	*105*
UBLIC WORKS	1.5	-	*1.5*	25	-	*25*
Toronto	1.5	-	*1.5*	25	-	*25*
T. LAWRENCE SEAWAY AUTHORITY	2.0	-	*2.0*	190	-	*190*
St. Catherines	-	-	-	190	-	*190*
Cornwall	2.0	-	*2.0*	-	-	-

Federal Scientific Establishments in Ontario, excluding Ottawa
Manpower and Expenditures
By Department or Agency, 1973.

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
VETERANS AFFAIRS	0.3	1.0	*1.3*	8	-	*8*
London	0.3	1.0	*1.3*	8	-	*8*
TOTAL	*1,265.7*	*3,578.5*	*4,844.2*	*114,764*	*12,354*	*127,118*

Federal Scientific Establishments in National Capital Region
Manpower and Expenditures
By Department or Agency, 1973

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
AGRICULTURE - TOTAL	346.0	1,106.0	*1,452.0*	19,628	1,266	*20,894*
Administration	34.0	68.0	*102.0*	1,258	-	*1,258*
Research	294.0	968.0	*1,262.0*	17,146	1,211	*18,357*
Health of Animals	18.0	70.0	*88.0*	1.224	55	*1,279*
ATOMIC ENERGY OF CANADA LIMITED	45.0	59.0	*104.0*	5,418	-	*5,418*
CANADIAN PATENT DEVELOPMENT LIMITED	11.0	14.0	*25.0*	612	-	*612*
CENTRAL MORTGAGE AND HOUSING	0.2	0.5	*0.7*	6	-	*6*
COMMUNICATIONS	156.0	375.0	*531.0*	8,848	14,514	*23,362*
CONSUMER AND CORPORATE AFFAIRS - TOTAL	210.0	239.5	*449.5*	8,716	100	*8,816*
Consumer Affairs	11.0	33.5	*44.5*	850	100	*950*
Corporate Affairs	199.0	206.0	*405.0*	3,866	-	*7,866*
ENERGY, MINES & RESOURCES - TOTAL	582.0	1,508.0	*2,090.0*	49,111	1,898	*51,009*
Mineral and Energy Resources	411.0	623.0	*1,034.0*	23,952	1,078	*25,030*
Mines Branch	248.0	425.0	*673.0*	13,547	551	*14,098*
Geological Survey of Canada	163.0	198.0	*361.0*	10,405	527	*10,932*
Earth Sciences	171.0	885.0	*1,056.0*	25,159	820	*25,979*

Federal Scientific Establishments in National Capital Region
Manpower and Expenditures
By Department or Agency, 1973

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
ENVIRONMENT - TOTAL	362.0	1,032.0	*1,394.0*	27,837	10,615	*38,452*
Fisheries and Marine	27.0	265.0	*292.0*	5,987	5,011	*10,998*
Fisheries Management and Research	-	-	-	1,355	4,130	*5,485*
Marine Science	27.0	265.0	*292.0*	4,632	881	*5,513*
Environmental Services	335.0	767.0	*1,102.0*	21,850	5,604	*27,454*
Environmental Protection	6.0	43.0	*49.0*	1,476	-	*1,476*
Environmental Management	329.0	724.0	*1,053.0*	20,374	5,604	*25,978*
EXTERNAL AFFAIRS	-	4.0	*4.0*	225	-	*225*
HEALTH AND WELFARE - TOTAL	195.6	332.3	*527.9*	10,468	589	*11,057*
Administration	6.0	15.0	*21.0*	363	-	*363*
Health Care	14.0	22.7	*36.7*	532	-	*532*
Health Protection	174.6	292.6	*467.2*	9,488	589	*10,077*
Non-Medical Use of Drugs	1.0	2.0	*3.0*	85	-	*85*
INDIAN AND NORTHERN AFFAIRS	5.0	2.0	*7.0*	366	66	*432*
INDUSTRY, TRADE AND COMMERCE	8.0	123.0	*131.0*	2,237	-	*2,237*
INTERNATIONAL DEVELOPMENT RESEARCH CENTRE	14.0	49.0	*63.0*	1,503	-	*1,503*
MEDICAL RESEARCH COUNCIL	4.0	23.0	*27.0*	735	-	*735*

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
NATIONAL DEFENCE - TOTAL	226.0	547.0	*773.0*	17,284	756	*18,040*
Defence Services	6.0	208.0	*214.0*	4,672	163	*4,835*
Defence Research Board	220.0	339.0	*559.0*	12,612	593	*13,205*
NATIONAL MUSEUMS	34.0	78.0	*112.0*	2,914	99	*3,013*
NATIONAL RESEARCH COUNCIL	799.2	1,883.5	*2,682.7*	55,491	8,839	*64,330*
POST OFFICE	6.0	19.3	*25.3*	421	346	*767*
PUBLIC WORKS	21.0	75.0	*96.0*	1,742	23	*1,765*
ST. LAWRENCE SEAWAY AUTHORITY	7.0	3.0	*10.0*	-	-	-
TRANSPORT - TOTAL	52.5	82.4	*134.9*	2,643	1,764	*4,407*
Headquarters	3.0	0.2	*3.2*	44	-	*44*
Marine Transportation	16.1	14.1	*30.2*	458	103	*561*
Air Transportation	33.4	68.1	*101.5*	2,141	1,661	*3,802*
TOTAL	*3,084.5*	*7,555.5*	*10,640.0*	*216,205*	*40,875*	*257,080*

Federal Scientific Establishments in Quebec, excluding Hull
Manpower and Expenditures
By Department or Agency, 1973.

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
AGRICULTURE - TOTAL	59.0	241.0	*300.0*	3,996	215	*4,211*
Research	58.0	238.0	*296.0*	3,916	214	*4,130*
La Pocatière	5.0	45.0	*50.0*	569	15	*584*
Ste-Foy	21.0	32.0	*53.0*	920	61	*981*
Normandin	2.0	25.0	*27.0*	293	10	*303*
St. Jean	17.0	43.0	*60.0*	796	47	*843*
Lennoxville	10.0	66.0	*76.0*	1,001	62	*1,063*
L'Assomption	3.0	27.0	*30.0*	337	19	*356*
Health of Animals	1.0	3.0	*4.0*	80	1	*81*
St. Anne de Bellevue	1.0	3.0	*4.0*	80	1	*81*
CANADIAN ARSENALS LIMITED	3.3	2.2	*5.5*	106	-	*106*
St. Paul l'Ermite	3.3	2.2	*5.5*	106	-	*106*
CANADIAN BROADCASTING CORPORATION	3.0	3.0	*6.0*	104	11	*115*
Montreal	3.0	3.0	*6.0*	104	11	*115*
ENERGY, MINES & RESOURCES - TOTAL	1.0	2.0	*3.0*	109	7	*116*
Mineral and Energy Resources	1.0	2.0	*3.0*	66	7	*73*
Quebec City	1.0	2.0	*3.0*	66	7	*73*
Earth Sciences	-	-	-	43	-	*43*
ENVIRONMENT - TOTAL	81.0	331.0	*412.0*	8,167	680	*8,847*
Fisheries & Marine	11.0	25.0	*36.0*	963	70	*1,033*
St. Anne de Bellevue	11.0	25.0	*36.0*	963	70	*1,033*

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
Environmental Services	70.0	306.0	*376.0*	7,204	610	*7,814*
(Atmospheric Environment)	30.0	174.0	*204.0*	3,734	271	*4,005*
Dorval	30.0	174.0	*204.0*	3,734	271	*4,005*
(Environmental Management)	40.0	132.0	*172.0*	3,470	339	*3,809*
Ste.-Foy	37.0	121.0	*158.0*	3,115	255	*3,370*
Cap. Tourmente	1.0	3.0	*4.0*	68	7	*75*
Percé	-	-	-	52	21	*73*
Montreal	1.0	7.0	*8.0*	235	56	*291*
Valleyfield	1.0	1.0	*2.0*	-	-	-
NATIONAL DEFENCE - TOTAL	151.0	1,127.0	*1,278.0*	19,684	1,112	*20,796*
Defence Services	30.0	521.0	*551.0*	8,473	22	*8,495*
Montreal	-	274.0	*274.0*	6,522	-	*6,522*
Nicolet	30.0	247.0	*277.0*	1,298	6	*1,304*
Valcartier	-	-	-	653	16	*669*
Defence Research Board	121.0	606.0	*727.0*	11,211	1,090	*12,301*
Valcartier	121.0	606.0	*727.0*	11,211	1,090	*12,301*
NATIONAL FILM BOARD	3.0	9.0	*12.0*	344	25	*369*
Montreal	3.0	9.0	*12.0*	344	25	*369*
NATIONAL RESEARCH COUNCIL	5.3	2.3	*7.6*	206	-	*206*
Montreal	3.0	1.0	*4.0*	107	-	*107*
Quebec	2.3	1.3	*3.6*	31	-	*31*
Great Whale River	-	-	-	68	-	*68*

Federal Scientific Establishments in Quebec, excluding Hull
Manpower and Expenditures
By Department or Agency, 1973.

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
PUBLIC WORKS	7.0	111.0	*118.0*	521	15	*536*
Montreal	7.0	111.0	*118.0*	521	15	*536*
ST. LAWRENCE SEAWAY AUTHORITY	6.5	2.0	*8.5*	331	23	*354*
Montreal	6.5	2.0	*8.5*	137	-	*137*
South Shore Canal	-	-	-	4	23	*37*
St. Lambert	-	-	-	190	-	*190*
TRANSPORT - TOTAL	15.0	28.0	*43.0*	1,122	5	*1,127*
Marine Transportation	3.0	18.0	*21.0*	362	5	*367*
Montreal	3.0	18.0	*21.0*	362	5	*367*
Transport Development Agency	12.0	10.0	*22.0*	760	-	*760*
Montreal	12.0	10.0	*22.0*	760	-	*760*
VETERANS AFFAIRS	2.3	5.0	*7.3*	85	-	*85*
Montreal	2.0	4.5	*6.5*	73	-	*73*
St. Anne de Bellevue	0.3	0.5	*0.8*	12	-	*12*
TOTAL	*337.4*	*1,863.5*	*2,200.9*	*34,775*	*2,093*	*36,868*

Federal Scientific Establishments in New Brunswick
Manpower and Expenditures
By Department or Agency, 1973.

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
AGRICULTURE - TOTAL	36.0	109.5	*145.5*	1,995	69	*2,064*
Research	33.0	104.0	*137.0*	1,936	66	*2,002*
Fredericton	33.0	104.0	*137.0*	1,936	66	*2,002*
Health of Animals	3.0	5.5	*8.5*	59	3	*62*
Sackville	3.0	5.5	*8.5*	59	3	*62*
ENERGY, MINES & RESOURCES - TOTAL	-	-	-	6	-	*6*
Earth Sciences	-	-	-	6	-	*6*
Seismological Network	-	-	-	6	-	*6*
ENVIRONMENT - TOTAL	141.0	459.5	*600.5*	7,984	659	*8,643*
Fisheries and Marine	31.0	74.5	*105.5*	2,132	222	*2,354*
St. Andrews	31.0	74.5	*105.5*	2,132	222	*2,354*
Environmental Services	110.0	385.0	*495.0*	5,852	437	*6,289*
(Atmospheric Environment)	52.0	213.0	*265.0*	4,155	287	*4,442*
Moncton	52.0	213.0	*265.0*	4,155	287	*4,442*
(Environmental Management)	58.0	172.0	*230.0*	1,697	150	*1,847*
Moncton	6.0	15.0	*21.0*	347	42	*389*
Fredericton	49.0	152.0	*201.0*	1,190	92	*1,282*
Sackville	3.0	5.0	*8.0*	160	16	*176*
TRANSPORT - TOTAL	-	-	-	4	-	*4*
Marine Transportation	-	-	-	4	-	*4*
Moncton	-	-	-	4	-	*4*
TOTAL	*177.0*	*569.0*	*746.0*	*9,989*	*728*	*10,717*

Federal Scientific Establishments in Nova Scotia
Manpower and Expenditures
By Department or Agency, 1973.

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
AGRICULTURE - TOTAL	37.0	117.0	*154.0*	2,129	77	*2,206*
Research	37.0	117.0	*154.0*	2,129	77	*2,206*
Kentville	33.0	82.0	*115.0*	1,653	61	*1,714*
Nappan	4.0	35.0	*39.0*	476	16	*492*
ENERGY, MINES & RESOURCES - TOTAL	27.0	53.0	*80.0*	1,985	466	*2,451*
Mineral and Energy Resources	27.0	53.0	*80.0*	1,979	466	*2,445*
Glace Bay	-	1.0	*1.0*	-	-	-
Dartmouth	27.0	52.0	*79.0*	1,752	288	*2,040*
Sydney	-	-	-	227	178	*405*
Earth Sciences	-	-	-	6	-	*6*
Seismological Network	-	-	-	6	-	*6*
ENVIRONMENT - TOTAL	171.5	697.2	*868.7*	17,235	2,449	*19,684*
Fisheries and Marine	143.0	638.7	*781.7*	15,552	2,151	*17,703*
Dartmouth	98.0	537.3	*635.3*	12,391	1,375	*13,766*
Halifax	45.0	101.4	*146.4*	3,161	776	*3,937*
Environmental Services	28.5	58.5	*87.0*	1,683	298	*1,981*
(Environmental Protection)	13.5	21.5	*35.0*	637	190	*827*
Halifax	13.5	21.5	*35.0*	637	190	*827*
(Environmental Management)	15.0	37	*52.0*	1,046	108	*1,154*
Dartmouth	1.0	-	*1.0*	-	-	
Halifax	14.0	37	*51.0*	1,046	108	*1,154*

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
NATIONAL DEFENCE - TOTAL	56.0	192.0	*248.0*	5,317	507	*5,824*
National Defence Research Board	56.0	155.0	*211.0*	4,224	507	*4,731*
Dartmouth	56.0	155.0	*211.0*	4,224	507	*4,731*
Defence Services	-	37.0	*37.0*	1,093	-	*1,093*
Halifax	-	37.0	*37.0*	1,093	-	*1,093*
NATIONAL RESEARCH COUNCIL	34.5	42.3	*76.8*	1,637	90	*1,727*
Halifax	34.5	42.3	*76.8*	1,637	90	*1,727*
VETERANS AFFAIRS	0.5	2.2	*2.7*	23	-	*23*
Halifax	0.5	2.2	*2.7*	23	-	*23*
TOTAL	*326.5*	*1,103.7*	*1,430.2*	*28,326*	*3,589*	*31,915*

Federal Scientific Establishments in Prince Edward Island
Manpower and Expenditures
By Department or Agency, 1973

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
AGRICULTURE - TOTAL	18.0	76.0	*94*	1,224	36	*1,260*
Research	18.0	76.0	*94*	1,224	36	*1,260*
Charlottetown	18.0	76.0	*94*	1,224	36	*1,260*
TOTAL	*18.0*	*76.0*	*94.0*	*1,224*	*36*	*1,260*

Federal Scientific Establishments in Newfoundland
Manpower and Expenditures
By Department or Agency, 1973

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
AGRICULTURE - TOTAL	6.0	32.0	*38.0*	519	17	*536*
Research	6.0	32.0	*38.0*			
St. John's West	6.0	32.0	*38.0*	519	17	*536*
ENERGY, MINES & RESOURCES - TOTAL				20	-	*20*
Earth Sciences	-	-	-	20	-	*20*
ENVIRONMENT - TOTAL	52.0	132.0	*184.0*	4,263	335	*4,598*
Fisheries & Marine	21.0	62.0	*83.0*	1,630	114	*1,744*
St. John's	21.0	62.0	*83.0*	1,630	114	*1,744*
Environmental Services	31.0	70.0	*101.0*	2,633	221	*2,854*
(Environmental Protection)	5.0	3.0	*8.0*	144	27	*171*
St. John's	5.0	3.0	*8.0*	144	27	*171*
(Environmental Management)	26.0	67.0	*93.0*	2,489	194	*2,683*
St. John's	26.0	67.0	*93.0*	2,489	194	*2,683*
TOTAL	*58.0*	*164.0*	*222.0*	*4,802*	*352*	*5,154*

Unallocated Manpower and Expenditures
By Department or Agency, 1973.

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
AGRICULTURE	-	-	-	6,892	619	*7,511*
Research	-	-	-	6,892	619	*7,511*
ENERGY, MINES & RESOURCES	101.0	156.0	*257.0*	3,020	2,291	*5,311*
Mineral and Energy Resources	8.0	3.0	*11.0*	530	-	*530*
Earth Sciences	93.0	153.0	*246.0*	2,490	2,291	*4,781*
ENVIRONMENT	-	25.0	*25.0*	-	2,600	*2,600*
Environmental Services	-	25.0	*25.0*	-	2,600	*2,600*
(Environmental Management)	-	25.0	*25.0*	-	2,600	*2,600*
NATIONAL HEALTH AND WELFARE	1.0	1.0	*2.0*	-	-	-
Medical Services	1.0	1.0	*2.0*	-	-	-
VETERANS AFFAIRS	-	-	-	19	-	*19*
TOTAL	*102.0*	*182.0*	*284.0*	*9,931*	*5,510*	*15,441*

TABLE 4 Federal Scientific Establishments, Natural Sciences
By Province, 1973

Federal Scientific Establishments
Natural Sciences, 1973

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
1. AGRICULTURE - TOTAL	958.6	3,119.4	*4,078.0*	65,536	4,498	*70,034*
1.1 Administration	34.0	68.0	*102.0*	1,258	-	*1,258*
National Capital Region	34.0	68.0	*102.0*	1,258	-	*1,258*
1.2 Research	880.0	2,885.0	*3,765.0*	60,442	4,013	*64,455*
British Columbia	71.0	222.0	*293.0*	4,528	217	*4,745*
Alberta	95.0	377.0	*472.0*	6,782	911	*7,693*
Saskatchewan	101.0	289.0	*390.0*	5,326	264	*5,590*
Manitoba	72.0	189.0	*261.0*	3,781	138	*3,919*
Ontario (excluding Ottawa)	95.0	273.0	*368.0*	6,263	243	*6,506*
National Capital Region	294.0	968.0	*1,262.0*	17,146	1,211	*18,357*
Quebec (excluding Hull)	58.0	238.0	*296.0*	3,916	214	*4,130*
New Brunswick	33.0	104.0	*137.0*	1,936	66	*2,002*
Nova Scotia	37.0	117.0	*154.0*	2,129	77	*2,206*
P.E.I.	18.0	76.0	*94.0*	1,224	36	*1,260*
Newfoundland	6.0	32.0	*38.0*	519	17	*536*
Unallocated	-	-	-	6,892	619	*7,511*
1.3 Health of Animals	30.0	110.0	*140.0*	1,975	85	*2,060*
British Columbia	2.0	4.0	*6.0*	98	2	*100*
Alberta	3.0	20.0	*23.0*	395	17	*412*
Saskatchewan	1.0	2.0	*3.0*	39	3	*42*
Manitoba	0.5	1.5	*2.0*	20	1	*21*
Ontario (excluding Ottawa)	1.5	4.0	*5.5*	60	3	*63*
National Capital Region	18.0	70.0	*88.0*	1,224	55	*1,279*
Quebec (excluding Hull)	1.0	3.0	*4.0*	80	1	*81*
New Brunswick	3.0	5.5	*8.5*	59	3	*62*
1.4 Canadian Grain Commission	14.6	56.4	*71.0*	1,861	400	*2,261*
Manitoba	14.6	56.4	*71.0*	1,861	400	*2,261*

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
2. ATOMIC ENERGY OF CANADA LIMITED	665.0	1,844.0	*2,509.0*	61,704	4,637	*66,341*
Manitoba	141.0	370.0	*511.0*	14,346	1,385	*15,731*
Ontario (excluding Ottawa)	479.0	1,415.0	*1,894.0*	41,940	3,252	*45,192*
National Capital Region	45.0	59.0	*104.0*	5,418	-	*5,418*
3. CANADIAN ARSENALS LTD.	3.3	2.2	*5.5*	106	-	*106*
Quebec (excluding Hull)	3.3	2.2	*5.5*	106	-	*106*
4. CANADIAN BROADCASTING CORPORATION	3.0	3.0	*6.0*	104	11	*115*
Quebec (excluding Hull)	3.0	3.0	*6.0*	104	11	*115*
5. CANADIAN PATENT DEVELOPMENT LIMITED	11.0	14.0	*25.0*	612	-	*612*
National Capital Region	11.0	14.0	*25.0*	612	-	*612*
6. CENTRAL MORTGAGE AND HOUSING CORP.	0.2	0.5	*0.7*	6	-	*6*
National Capital Region	0.2	0.5	*0.7*	6	-	*6*
7. COMMUNICATIONS	156.0	375.0	*531.0*	8,848	14,514	*23,362*
National Capital Region	156.0	375.0	*531.0*	8,848	14,514	*23,362*
8. CONSUMER & CORPORATE AFFAIRS-TOTAL	210.0	239.5	*449.5*	8,716	100	*8,816*
8.1 Consumer Affairs	11.0	33.5	*44.5*	850	100	*950*
National Capital Region	11.0	33.5	*44.5*	850	100	*950*
8.2 Corporate Affairs	199.0	206.0	*405.0*	7,866	-	*7,866*
National Capital Region	199.0	206.0	*405.0*	7,866	-	*7,866*

Federal Scientific Establishments
Natural Sciences, 1973

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
9. ENERGY, MINES & RESOURCES - TOTAL	844.0	1,842.0	*2,686.0*	61,195	6,089	*67,284*
9.1 Mineral and Energy Resources	559.0	778.0	*1,337.0*	31,549	2,627	*34,176*
9.1A Mines Branch	260.0	447.0	*707.0*	14,682	902	*15,584*
Alberta	5.0	9.0	*14.0*	334	103	*437*
Ontario (excluding Ottawa)	6.0	10.0	*16.0*	508	63	*571*
National Capital Region	248.0	425.0	*673.0*	13,547	551	*14,098*
Quebec (excluding Hull)	1.0	2.0	*3.0*	66	7	*73*
Nova Scotia	-	1.0	*1.0*	227	178	*405*
9.1B Geological Survey of Canada	291.0	328.0	*619.0*	16,337	1,725	*18,062*
British Columbia	29.0	16.0	*45.0*	874	27	*901*
Alberta	72.0	62.0	*134.0*	3,306	883	*4,189*
National Capital Region	163.0	198.0	*361.0*	10,405	527	*10,932*
Nova Scotia	27.0	52.0	*79.0*	1,752	288	*2,040*
Unallocated	8.0	3.0	*11.0*	530	-	*530*
9.2 Earth Sciences	285.0	1,064.0	*1,349.0*	29,647	3,461	*33,108*
British Columbia	-	-	-	180	36	*216*
Yukon & N.W.T.	-	10.0	*10.0*	371	168	*539*
Alberta	15.0	12.0	*27.0*	699	-	*699*
Saskatchewan	-	-	-	621	147	*768*
Manitoba	-	-	-	32	-	*32*
Ontario (excluding Ottawa)	6.0	4.0	*10.0*	19	-	*19*
National Capital Region	171.0	885.0	*1,056.0*	25,159	820	*25,979*
Quebec (excluding Hull)	-	-	-	43	-	*43*
New Brunswick	-	-	-	6	-	*6*
Nova Scotia	-	-	-	6	-	*6*
Newfoundland	-	-	-	20	-	*20*
Unallocated	93.0	153.0	*246.0*	2,490	2,291	*4,781*
10. ENVIRONMENT - TOTAL	2,047.5	5,987.7	*8,035.2*	169,751	32,000	*201,751*

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
10.1 Fisheries and Marine	420.0	1,719.2	*2,139.2*	45,322	10,361	*55,683*
10.1A Fisheries Management & Research	306.0	554.2	*860.2*	20,417	7,500	*27,917*
British Columbia	85.0	180.0	*265.0*	5,846	975	*6,821*
Manitoba	75.0	72.0	*147.0*	3,798	941	*4,739*
National Capital Region	-	-	-	1,355	4,130	*5,485*
Quebec (excluding Hull)	11.0	25.0	*36.0*	963	70	*1,033*
New Brunswick	31.0	74.5	*105.5*	2,132	222	*2,354*
Nova Scotia	83.0	140.7	*223.7*	4,693	1,048	*5,741*
Newfoundland	21.0	62.0	*83.0*	1,630	114	*1,744*
10.1B Marine Sciences	114.0	1,165.0	*1,279.0*	24,905	2,861	*27,766*
British Columbia	23.0	252.0	*275.0*	5,678	602	*6,280*
Ontario (excluding Ottawa)	4.0	150.0	*154.0*	3,736	275	*4,011*
National Capital Region	27.0	265.0	*292.0*	4,632	881	*5,513*
Nova Scotia	60.0	498.0	*558.0*	10,859	1,103	*11,962*
10.2 Environmental Services	1,627.5	4,268.5	*5,896.0*	124,429	21,639	*146,068*
10.2A Environmental Protection	33.5	91.5	*125.0*	3,535	2,068	*5,603*
Alberta	3.0	-	*3.0*	50	183	*233*
Ontario (excluding Ottawa)	6.0	24.0	*30.0*	1,228	1,668	*2,896*
National Capital Region	6.0	43.0	*49.0*	1,476	-	*1,476*
Nova Scotia	13.5	21.5	*35.0*	637	190	*827*
Newfoundland	5.0	3.0	*8.0*	144	27	*171*
10.2B Atmospheric Environment	658.0	1,875.0	*2,533.0*	60,368	5,320	*65,688*
British Columbia	31.0	163.0	*194.0*	3,365	277	*3,642*
Alberta	49.0	243.0	*292.0*	4,607	308	*4,915*
Manitoba	48.0	260.0	*308.0*	6,296	974	*7,270*
Ontario (excluding Ottawa)	448.0	822.0	*1,270.0*	38,211	3,203	*41,414*
Quebec (excluding Hull)	30.0	174.0	*204.0*	3,734	271	*4,005*
New Brunswick	52.0	213.0	*265.0*	4,155	287	*4,442*
10.2C Environmental Management	936.0	2,302.0	*3,238.0*	60,526	14,251	*74,777*
British Columbia	157.0	323.0	*480.0*	8,002	961	*8,963*
Yukon and N.W.T.	5.0	21.0	*26.0*	854	74	*928*
Alberta	98.0	262.0	*360.0*	7,874	475	*8,349*
Saskatchewan	17.0	42.0	*59.0*	1,190	190	*1,380*
Manitoba	13.0	46.0	*59.0*	1,084	155	*1,239*

Federal Scientific Establishments
Natural Sciences, 1973

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
Ontario(excluding Ottawa)	178.0	451.0	*629.0*	12,446	3,401	*15,847*
National Capital Region	329.0	724.0	*1,053.0*	20,374	5,604	*25,978*
Quebec(excluding Hull)	40.0	132.0	*172.0*	3,470	339	*3,809*
New Brunswick	58.0	172.0	*230.0*	1,697	150	*1,847*
Nova Scotia	15.0	37.0	*52.0*	1,046	108	*1,154*
Newfoundland	26.0	67.0	*93.0*	2,489	194	*2,683*
Unallocated	-	25.0	*25.0*	-	2,600	*2,600*
11. EXTERNAL AFFAIRS	-	4.0	*4.0*	225	-	*225*
National Capital Region	-	4.0	*4.0*	225	-	*225*
12. HEALTH AND WELFARE	197.6	335.3	*532.9*	10,935	589	*11,524*
12.1 Administration (Medico -Social Statistics)	6.0	15.0	*21.0*	363	-	*363*
National Capital Region	6.0	15.0	*21.0*	363	-	*363*
12.2 Health Care	14.0	22.7	*36.7*	532	-	*532*
National Capital Region	14.0	22.7	*36.7*	532	-	*532*
12.3 Medical Services	2.0	3.0	*5.0*	467	-	*467*
British Columbia	-	-	-	34	-	*34*
Yukon & N.W.T.	-	-	-	350	-	*350*
Alberta	-	-	-	33	-	*33*
Saskatchewan	-	-	-	33	-	*33*
Manitoba	-	-	-	17	-	*17*
Unallocated	-1.0	1.0	*2.0*	-	-	-
12.4 Health Protection	174.6	292.6	*467.2*	9,488	589	*10,077*
National Capital Region	174.6	292.6	*467.2*	9,488	589	*10,077*
12.5 Non-Medical Use of Drugs	1.0	2.0	*3.0*	85	-	*85*
National Capital Region	1.0	2.0	*3.0*	85	-	*85*

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
13. INDIAN AND NORTHERN AFFAIRS	9.0	9.0	*18.0*	557	81	*638*
Yukon and N.W.T.	4.0	7.0	*11.0*	191	15	*206*
National Capital Region	5.0	2.0	*7.0*	366	66	*432*
14. INDUSTRY, TRADE AND COMMERCE	8.0	123.0	*131.0*	2,237	-	*2,237*
National Capital Region	8.0	123.0	*131.0*	2,237	-	*2,237*
15. INTERNATIONAL DEVELOPMENT RESEARCH CENTRE	14.0	49.0	*63.0*	1,503	-	*1,503*
			63.0			
National Capital Region	14.0	49.0	*63.0*	1,503	-	*1,503*
16. MEDICAL RESEARCH COUNCIL	4.0	23.0	*27.0*	735	-	*735*
National Capital Region	4.0	23.0	*27.0*	735	-	*735*
17. NATIONAL DEFENCE - TOTAL	542.0	2,958.0	*3,500.0*	68,062	4,003	*72,065*
17.1 Defence Services	41.0	1,498.0	*1,539.0*	30,662	999	*31,661*
British Columbia	1.0	29.0	*30.0*	968	19	*987*
Alberta	4.0	423.0	*427.0*	8,332	795	*9,127*
Ontario(excluding Ottawa)	-	280.0	*280.0*	7,124	-	*7,124*
National Capital Region	6.0	208.0	*214.0*	4,672	163	*4,835*
Quebec(excluding Hull)	30.0	521.0	*551.0*	8,473	22	*8,495*
Nova Scotia	-	37.0	*37.0*	1,093	-	*1,093*
17.2 Defence Research Board	501.0	1,460.0	*1,961.0*	37,400	3,004	*40,404*
British Columbia	36.0	76.0	*112.0*	2,853	260	*3,113*
Alberta	33.0	166.0	*199.0*	4,000	308	*4,308*
Ontario(excluding Ottawa)	35.0	118.0	*153.0*	2,500	246	*2,746*
National Capital Region	220.0	339.0	*559.0*	12,612	593	*13,205*
Quebec(excluding Hull)	121.0	606.0	*727.0*	11,211	1,090	*12,301*
Nova Scotia	56.0	155.0	*211.0*	4,224	507	*4,731*

Federal Scientific Establishments
Natural Sciences, 1973

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
18. NATIONAL FILM BOARD	3.0	9.0	*12.0*	344	25	*369*
Quebec(excluding Hull)	3.0	9.0	*12.0*	344	25	*369*
19. NATIONAL MUSEUMS	34.0	78.0	*112.0*	2,914	99	*3,013*
National Capital Region	34.0	78.0	*112.0*	2,914	99	*3,013*
20. NATIONAL RESEARCH COUNCIL	921.1	2,058.7	*2,979.8*	62,350	9,366	*71,716*
British Columbia	35.0	38.4	*73.4*	1,307	362	*1,669*
Saskatchewan	38.2	61.7	*99.9*	1,793	75	*1,868*
Manitoba	5.5	4.0	*9.5*	1,410	-	*1,410*
Ontario(excluding Ottawa)	3.4	26.5	*29.9*	506	-	*506*
National Capital Region	799.2	1,883.5	*2,682.7*	55,491	8,839	*64,330*
Quebec(excluding Hull)	5.3	2.3	*7.6*	206	-	*206*
Nova Scotia	34.5	42.3	*76.8*	1,637	90	*1,727*
21. POST OFFICE	6.0	19.3	*25.3*	421	346	*767*
National Capital Region	6.0	19.3	*25.3*	421	346	*767*
22. PUBLIC WORKS	29.5	186.0	*215.5*	2,288	38	*2,326*
Ontario(excluding Ottawa)	1.5	-	*1.5*	25	-	*25*
National Capital Region	21.0	75.0	*96.0*	1,742	23	*1,765*
Quebec(excluding Hull)	7.0	111.0	*118.0*	521	15	*536*
23. REGIONAL ECONOMIC EXPANSION	4.0	9.0	*13.0*	152	-	*152*
						152
Saskatchewan	4.0	9.0	*13.0*	152	-	*152*
24. ST. LAWRENCE SEAWAY AUTHORITY	15.5	5.0	*20.5*	521	23	*544*
Ontario(excluding Ottawa)	2.0	-	*2.0*	190	-	*190*
National Capital Region	7.0	3.0	*10.0*	-	-	-
Quebec(excluding Hull)	6.5	2.0	*8.5*	331	23	*354*

Department or Agency	Manpower			Expenditures ($ 000)		
	Scientific & Professional	Others	*Total*	Current	Capital	*Total*
25. TRANSPORT - TOTAL	67.5	110.4	*177.9*	3,769	1,769	*5,538*
25.1 Headquarters	3.0	0.2	*3.2*	44	-	*44*
National Capital Region	3.0	0.2	*3.2*	44	-	*44*
25.2 Marine Transportation	19.1	32.1	*51.2*	824	108	*932*
National Capital Region	16.1	14.1	*30.2*	458	103	*561*
Quebec(excluding Hull)	3.0	18.0	*21.0*	362	5	*367*
New Brunswick	-	-	-	4	-	*4*
25.3 Air Transportation	33.4	68.1	*101.5*	2,141	1,661	*3,802*
National Capital Region	33.4	68.1	*101.5*	2,141	1,661	*3,802*
25.4 Transport Development Agency	12.0	10.0	*22.0*	760	-	*760*
Quebec (excluding Hull)	12.0	10.0	*22.0*	760	-	*760*
26. VETERANS AFFAIRS	6.0	18.0	*24.0*	231	-	*231*
British Columbia	1.5	8.0	*9.5*	59	-	*59*
Manitoba	1.5	1.8	*3.3*	37	-	*37*
Ontario (excluding Ottawa)	0.2	1.0	*1.2*	8	-	*8*
Quebec (excluding Hull)	2.3	5.0	*7.3*	85	-	*85*
Nova Scotia	0.5	2.2	*2.7*	23	-	*23*
Unallocated	-	-	-	19	-	*19*
TOTAL	6,759.8	19,422.0	*26,181.8*	533,822	78,188	*612,010*

PART TWO

Activities of Federal Scientific Establishments
By Department or Agency

PROVINCE

Federal Research Establishments in BRITISH COLUMBIA, 1973.

1. AGRICULTURE

Research Branch

Research Station, Agassiz

Research is primarily directed to the needs of the agricultural industry of the lower mainland, and provides agricultural businesses and farmers with up-to-date information on developments in the research program through quarterly reports. The main concerns are soil science, vegetables, small fruits, animal science and forage crops.

The dairy herd at Agassiz is part of the National Dairy Cattle Breeding Project. Nutritional and management studies are performed by the Animal Science Group.

A substation at Abbotsford conducts cultural experiments on strawberries and raspberries. Soil drainage work is carried out in conjunction with the British Columbia Department of Agriculture.

Research Station, Kamloops

The Research Station specializes in range management studies and primarily serves the ranching industry of the southern interior of British Columbia. Of special concern is the integrated use of natural resources on rangelands, such as logging and forest regeneration, and competition for feed between deer and cattle.

Major areas of research include: entomology, livestock management and resource and forage management. Some topics previously covered were: studies of beetle defoliation causing wide damage to sagebrush in B.C., the isolation of a toxic nitro compound which poisoned livestock and an increase in beef production from hay grown on organic soil.

Research Station, Sidney

Activities here centre around the improvement, culture and protection of ornamental and greenhouse crops. Of increasing interest is the work of the Post-Entry Quarantine Station, operated jointly with the Plant Protection

1. AGRICULTURE (cont'd)

Division, Production and Marketing Branch.

The successful research activities of the Station in horticultural crops have benefited commercial growers, with increased yields in greenhouse tomatoes, for example. Trials for control of a common greenhouse pest, the greenhouse whitefly, have shown good results.

Besides the cultivation of crops, the Station also investigates matters concerned with the shipping and packaging of ornamentals.

Research Station, Summerland

The Research Station places special emphasis on the problems of the fruit and vegetable industry in the region, and also carries out national projects with wide application to the industry throughout Canada. The problems of the fruit industry in the B.C. interior are the main concern but other Research Branch programs conducted were: trickle irrigation, grape and sweet cherry breeding, and moth control by use of sterile insects.

The Station houses seven sections: Agricultural Engineering, Animal Science, Entomology, Food Processing, Plant Pathology, Pomology, and Soil Science.

Research Station, Vancouver

Vancouver is the national centre of research on plant viruses. Biochemical investigations are leading to the identification of the properties and structures of viruses affecting small fruits and forage crops.

The plant pathology section has developed treatments for the production of virus free seed potatoes in a program which began in 1966. Entomologists are studying the agents which transmit plant viruses and investigating methods of control with emphasis on biological control to complement the chemical methods. Land in the central interior of British Columbia was surveyed and soil capabilities for agriculture and forestry were assessed for the preparation of soil capability maps.

Federal Scientific Establishments in BRITISH COLUMBIA, 1973.

1. AGRICULTURE (cont'd)

Health of Animals Branch

Laboratory, Vancouver

As with all Health of Animals Branch stations, the Vancouver Laboratory was set up primarily as a service facility for the testing of brucellosis in cattle. It is still primarily a service establishment directed to the needs of the Meat Inspection Branch and the Animal Pathology Division of the Department. Some research is presently being done on the causes of foot rot and liver ulcers in cattle.

9. ENERGY, MINES & RESOURCES

Mineral and Energy Resources Program

Cordilleran and Pacific Margin Section, Vancouver

The activities of this section of the Regional and Economic Geology Division are directed towards two inter-related objectives: the completion of the reconnaissance phase of regional investigation to provide a broad geological and tectonic framework for the Cordilleran region and detailed studies of specific problems to further the understanding of the nature and sequence of geological processes, especially the formation and localization of mineral deposits.

The Marine Geology Section is conducting a long-range program of geological and geophysical studies of the Pacific Continental Shelf to provide information on hydrocarbon and other resource potential. These investigations are undertaken in conjunction with the related activities of other sections and divisions of the Geological Survey of Canada and the Mineralogical Branch of the British Columbia Department of Mines and Petroleum Resources.

9. ENERGY, MINES & RESOURCES (cont'd)

Earth Sciences Program

Victoria Geophysical Observatory

The Earth Physics Branch maintains a cross-country network of seismic observatories which provide an improved knowledge of earthquake hazards and improved detection of underground nuclear explosions. The first regular seismic recording in Canada began in Toronto in 1897 and Victoria followed in 1899. Today there are thirty stations, one roughly every 500 miles.

10. ENVIRONMENT

Fisheries and Marine Program

Biological Station, Nanaimo

Research undertaken concerns commercial and recreational fisheries and the effects of man's activities on aquatic organisms.

Work is concentrated in several areas: the biology of aquatic resources involving the assessments of fish stocks, the productivity of the aquatic environment as gauged by fisheries oceanography, increasing the productive capacity of the aquatic environment by such methods as lake fertilization and the augmentation of resource supply. Also of major concern to the station is pollution control, estuarine, logging and stream ecology.

Pacific Environment Institute, West Vancouver

The Pacific Oceanographic Group at the Nanaimo Station essentially carries out the work of the institute. Areas of interest include Northeast Pacific Oceanography information for ecological studies as well as variability in oceanic and continental shelf waters, coastal oceanography and the polluting effect of wood solids on water quality.

Federal Scientific Establishments in BRITISH COLUMBIA, 1973.

10. ENVIRONMENT (cont'd)

Laboratory, Vancouver

One of the main concerns of the Vancouver Laboratory is the handling and processing of fish. Fish preservation at sea and on shore, the canning and chilling of various species and fish sorting by automatic methods have been some specific topics of concern.

The Vancouver Laboratory is also investigating specialized products and additional food uses of many varieties of fish.

Marine Sciences Regional Pacific Office, Victoria

The Marine Science Directorate in the Pacific Region consists of the following divisions: Hydrographic, Ocean Chemistry, and Ocean Physics.

The Hydrographic Division continued its survey program for the B.C. coast, collecting magnetic, hydrological and geological data. The Hydrographic Development Group is involved in evaluating new hydrographic equipment and techniques. Other sections of this division continue tidal and current surveys and may conduct special surveys.

Studies of marine hydrocarbons, trace metals, the marine carbon dioxide 'budget' and other chemical oceanographic analyses are carried out by the Ocean Chemistry Division.

The Ocean Physics Division concerns itself with offshore oceanography, the oceanography of the coastal zone, including Arctic oceanography, remote sensing, and frozen sea studies.

Environmental Services Program

(Atmospheric Environment Service)
Pacific Regional Office, Vancouver

The AES is primarily interested in the earth's atmosphere and manages programs to provide information on current and predicted meteorological conditions of the Canadian climate. It also carries out and promotes research on atmospheric behaviour.

10. ENVIRONMENT (cont'd)

Environmental Services Program

(Atmospheric Environment Service) (cont'd)
Pacific Regional Office, Vancouver

The regional office in Vancouver coordinates the data collection of various regional stations and submits the information to the computer service for charting and forecasting. The regional office also responds to local requests for information.

(Environmental Management Service)
Western Forest Products Laboratory

The laboratory maintains close liaison with the British Columbia and Alberta forest products industries. Subjects of particular interest at the laboratory include: stress-strength relationships in Canadian lumber, plywood manufacturing, timber engineering, forest products pathology, wood utilizations, and the anatomy, chemistry and preservation of wood. Naturally, insects and diseases that affect wood products are of special concern.

Pacific Forest Research Centre, Victoria

This is one of six regional establishments of the Forestry Service. Activities are concentrated on resource and management research, including land classification, mensuration, silviculture, tree nursery practices, and specific problems of young forests. Forest protection is vital to the continuing forest industry and research is conducted in insect pathology, entomology, decay and forest fire research. The forest insect and disease survey is conducted as part of the national survey.

Canadian Wildlife Service, Vancouver

The program in British Columbia has included population surveys of migratory birds, a survey of important waterfowl habitats in the province, nutritional studies on caribou and reindeer populations; and research and planning in the national parks.

10. ENVIRONMENT (cont'd)

The CWS cooperates to a large extent with other government agencies and interested public groups. Cooperative ventures include a Federal-Provincial Cooperative Wetland Inventory covering all important waterfowl habitats in the province, and surveys of migratory birds performed in the field by student organizations in Canada and the United States.

Pacific Water Quality Station, Vancouver

The Water Quality Division, in the support of federal and federal-provincial water management programs, collects data on the quality of water systems. The Vancouver laboratory conducts automated analyses of organic and inorganic substances in water and determines pollution indicators at extremely low levels of concentration.

17. NATIONAL DEFENCE

Defence Services Program

Canadian Forces Maritime Experimental and Test Ranges, (CFMETR), Rocky Point and Nanoose

The Rocky Point unit conducts a torpedo workshop for torpedos to be used by the Pacific fleet and is responsible for the supply of torpedos.

At Nanoose, an instrumental range is used for the testing of torpedos and sonabuoys. The Nanoose establishment is responsible for the evaluation, design and modification of such Maritime munitions.

17. NATIONAL DEFENCE (cont'd)

Defence Research Board

Defence Research Establishment Pacific (DREP), Esquimault

The research field of primary concern to DREP is underwater surveillance and detection in the Northeast Pacific Ocean and the Arctic Archipelago. The establishment's objective is to improve the effectiveness of the Maritime units of the Canadian Armed Forces in the accomplishment of their assigned tasks. Detection systems in use rely mainly on acoustic ranging or magnetic anomaly detection; therefore, emphasis is placed on research into environmental factors that determine threshold limits in these systems.

20. NATIONAL RESEARCH COUNCIL

Dominion Astrophysical Observatory, Victoria

The Dominion Astrophysical Observatory has been the principal federal government laboratory for astrophysical research using optical telescopes for more than fifty years. Research programs undertaken at the observatory are based on studies of stellar spectra and when required these data are supplemented by photometric observations. Programs in progress include study of stellar atmospheres and stellar structure, double stars and star clusters, the motion and distribution of stars in the galaxy and the properties of the interstellar medium.

Some staff are involved in development of instrumentation such as the new data acquisition system, which enables the observations to be digitized for computer analysis.

Dominion Radio Astrophysical Observatory, Penticton

This observatory is devoted to the study of natural radio emissions from astronomical objects. The location is sufficiently "quiet" to enable measurements in frequency ranges which are normally inaccessible. Facilities include two large antenna arrays that have provided data on the spectra of sources at low frequencies, a large paraboloid receiver, and a combination of two paraboloids on a 1,000 foot railway track which together are capable of high resolution studies of radio spectral lines.

Federal Scientific Establishments in BRITISH COLUMBIA, 1973.

20. NATIONAL RESEARCH COUNCIL

Regional Station, Building Research, Vancouver

The building research at this station, one of five regional stations, is directed to the identification and solution of the problems of the construction industry peculiar to the climate and geographical conditions of British Columbia. Close links are maintained with the construction industry to facilitate the dissemination of such information.

Field Station, Rogers Pass

Avalanches are a major hazard for growing development and recreational activity in the mountainous regions of Canada. The Geotechnical section of the Building Research Division is investigating the characteristics of avalanches at a small field station at Rogers Pass.

26. VETERANS AFFAIRS

Shaugnessy Hospital, Vancouver

The Treatment Services Program Research Advisory Board is conducting a major reassessment of its research policies as they affect veterans to develop a plan for the effective provision of care for aging victims.

9. ENERGY, MINES & RESOURCES

Earth Sciences Program

Seismological Station, Yellowknife

The seismology program of Energy, Mines and Resources is conducted to establish and maintain a national system of seismic observatories with competence in seismic interpretation and instrumentation. Seismology contributes data to the analysis of earthquakes throughout the world and to the detection and identification of underground nuclear explosions, in accordance with Canada's geographical extent and excellent terrain for seismic observations.

A short and long-period seismic array has been established at Yellowknife, N.W.T.

Geomagnetic Network, Northwest Territories

This network is necessary to maintain an up-to-date description and understanding of the earth's magnetic field over Canada and the adjacent ocean areas as required for resource development, navigation, telecommunication and national defence.

10. ENVIRONMENT

Environmental Services Program

(Environmental Management)

Canadian Wildlife Service, West Arctic and Fort Smith

The northern establishments participate in the general western programs on migratory birds, land management, mammalogy, ecology, limnology, and pathology. Studies of specific concern to the north have included waterfowl distribution in the western Arctic, the nesting ground ecology of whistling swans, barren-ground caribou, wolf-caribou relationships, wolverines, furbearers in the MacKenzie Delta, grizzly bear ecology, big game management in the MacKenzie mountains, and the ecology of alpine vegetation.

10. ENVIRONMENT (cont'd)

Water Survey of Canada Fort Smith, Whitehorse

Data from over 100 gauging stations in the Yukon and the Northwest Territories provide information on flows, water levels and sediments. Collection programs are undertaken for specific government programs as requested, and some work is performed on network design, flow forecasting and data analysis. As with all Water Survey establishments, the data is published annually.

12. HEALTH AND WELFARE

Medical Services Branch

This branch operates an Indian and Northern Health program designed to assist Canadian Indians and residents of the Territories to have access to health services similar to those of other Canadian residents.

A special infant protection project with the objectives of reducing infant and pre-school mortality and morbidity is being conducted at Eskimo Point, N.W.T.

13. INDIAN AND NORTHERN AFFAIRS

Research Laboratory, Inuvik

The laboratory facilities are generally available to anyone conducting research in the north. The department's research activities are not extensive, but universities often make use of its general research facilities. A program of Arctic Land Use Research is presently being carried on, with work in geology, geography, hydrology, and related fields.

Federal Scientific Establishments in ALBERTA, 1973

1. AGRICULTURE

Research Branch

Research Station, Beaverlodge

The Research Station at Beaverlodge is associated with experimental farms at Prince George B.C. and Fort Vermilion, Alberta; their combined activities make up Agriculture's Northern Research Group.

The group has four main sections: environment and special crops, cereal and oilseed crops, forage crops and soils. Recent studies included a herbage testing program for the OECD conducted by the forage section; an assessment of agricultural land along the MacKenzie River, N.W.T.; and for the Peace-Athabasca Delta Project, Fort Chipewyan, Alberta, an evaluation of the capacity of the Delta to support bison. Forage crop production and management research continued as the main activity at Fort Vermilion and at Prince George where beef animals are used to test forage utilization.

Research Station, Lacombe

The Research Station at Lacombe has several sections, mainly animal science, plant breeding, and crop management and soils; a substation at Vegreville deals with soil physics and chemistry.

Three years of intensive research at Lacombe into beef carcass evaluation led to the introduction in April, 1972, of new beef carcass grading standards. Research continues into meats, identifying improved parameters of meat quality, tenderness, etc. Successful transplanting of embryos from Limousin and Simmental cows into recipient cows was achieved at the Station during 1972.

Disease surveys of cereal, forage and rapeseed crops in central Alberta were conducted and the Crop Management and Soils section carried out weed research with some encouraging progress in perennial weed control, especially quack grass, enabling substantial barley crop increases.

1. AGRICULTURE (cont'd)

Research Station, Lethbridge

Emphasis at the Lethbridge Research Station continues to be placed on research concerned with crop losses; development of new crops; forage, grass, and grain breeding; nutrition, management and breeding practices for beef and sheep production; biological disposal of crop and animal wastes; management of pesticide residues; and control of economically important diseases and insects.

The station is comprised of seven sections: economics, animal science - beef and dairy cattle, and sheep; crop entomology - cutworms, grasshoppers, and insects; plant pathology and physiology; plant science - involving breeding experiments for yield maximization and other desirable characteristics; soil science - consisting of soil management and fertility, irrigation and drainage and soil properties; and veterinary-medical entomology - biting flies as an interference to the management of cattle, and work on chemical controls.

The station maintains close liaison with the Alberta Department of Agriculture and grower and producer organizations in the application of its research results.

Health of Animals Branch

Laboratory, Lethbridge

Functioning primarily as a service centre directed to the needs of the branch, the laboratory conducts tests for brucellosis and other diseases. It also serves as the beef cattle centre for beef being exported, and conducts all the necessary testing associated with exports.

9. ENERGY, MINES & RESOURCES

Mineral and Energy Resources Program

Mines Branch Research Centre, Calgary

Research is directed primarily to coal mining and increasing the recoverable amount of coal. Attention is given to the effect of the geological structure on mine design and safety - such considerations as slope stability, roof stability

9. ENERGY, MINES & RESOURCES (cont'd)

and outburst, and to the development of open pit mines for coal and base metals.

Mines Branch Fuels Research, Edmonton

The activities are concentrated almost entirely on coal and the evaluation of coke in coals. Of prime concern is coal beneficiation, that is, the cleaning of coal using cyclone separators, and some effort is directed to the design of such cleaning equipment. Some work on tarsands is also carried out.

Institute of Sedimentary and Petroleum Geology, Calgary

The institute, which has been opened since 1967, is housed next to the University of Calgary campus and to some extent the two institutions collaborate (i. e. training of graduate students, shared use of large machinery). The institute is responsible, through field and laboratory research, for describing the geology of the western and northern sedimentary basins, from the 49th parallel to the Arctic Islands and between the Canadian Shield and the Rocky Mountain Trench. The emphasis in research continues to stress collaborative programs designed to elucidate and describe the geological history and structure of sedimentary basins with a view to providing geological data and interpretation necessary to exploration and exploitation of mineral resources. Evaluations of resource occurrence and distribution, specifically hydrocarbons, coal and minerals, are undertaken.

The institute is located in the midst of a large scientific community associated with geology, geophysics, and related disciplines, as Calgary is the headquarters of many Canadian oil companies and associated research organizations. In addition to its research functions, it is responsible for the custody of drilling cores, samples, and other data resulting from both onshore and offshore exploitation activities by industry in the Yukon Territory, Northwest Territories and Arctic Islands and for drilling samples from all provinces and continental shelves of western Canada.

Federal Scientific Establishments in ALBERTA, 1973

10. ENVIRONMENT

Environmental Services Program

(Environmental Protection)
Northwestern Regional Office, Edmonton

The Edmonton office is one of five regional offices enforcing environmental protection regulations - Atlantic, Quebec, Ontario, Northwest and Pacific. The coordination of programs and administrative services is provided from Ottawa. The Environmental Protection Service maintains five programs - Water Pollution Control, Air Pollution Control, Ecological Protection, Environmental Emergency and Federal Activities Protection Program.

(Atmospheric Environment)
Western Regional Office, Edmonton

The various weather stations of the network in the west report daily meteorological data to provide forecasters throughout the world with observations and obtain basic data for climatological records and applied studies.

(Environmental Management)
West Water Quality Station, Calgary

The Calgary laboratory conducts standard water analysis on samples sent from various sampling stations in support of several federal and provincial water management programs. Special studies included work on the Peace-Athabasca, and the Qu'Appelle systems.

10. ENVIRONMENT (cont'd)

Water Survey of Canada, Calgary

Water quantity data collection from 470 gauging stations is coordinated to obtain information on flows, levels, sediment, water quality, and reservoir contents. The Calgary office is also involved in glacier studies, snow surveys, and miscellaneous data collection for specific programs as required. Some studies are devoted to network design, data analysis and flow forecasting. Calgary has been the base for the literature review and state-of-the-art surveys carried out as part of the Hydrology Research Division's Subsurface Disposal Research Program, (SDRP), and has undertaken the development of SDRP instruments. Some northern hydrology investigations concerned with the occurrence of springs and quality of groundwaters have been based in Calgary.

Canadian Wildlife Service, Edmonton

The Edmonton office has been concerned with the surveying and banding of migratory birds, the enforcement of laws relating to wildlife hunting, and the issuing of scientific permits. Specific studies have been devoted to feather chemistry, the origin of waterfowl and radar studies of bird movements to calculate hazards to aircraft, the influence of small mammals on forest regeneration, biotic communities in western parks, bighorns, wolves, watershed research, and toxic chemicals.

Northern Forest Research Centre, Edmonton

The Northern Forest Research Centre serves Alberta, Saskatchewan, Manitoba, the Yukon and Northwest Territories in two broad categories - forest protection research and forest resources research.

The forest protection research activities consist of programs to protect trees from fire, insects and disease. The Forest Insect and Disease Survey Group concentrate on detection and assessment and carry out an annual inspection of woodfibre, watershed, recreation forests, parks, and shelter belts.

10. ENVIRONMENT (cont'd)

Northern Forest Research Centre, Edmonton (Cont'd)

Forest resources research involves programs to improve the quality of trees and the land and water associated with them. Forest hydrology is an important aspect of the Centre's forest resources research, since so much Prairie water comes from the eastern slopes of the Rockies. Research is aimed at management of the watersheds to ensure delivery of high quality where needed.

17. NATIONAL DEFENCE

Defence Services Program

Canadian Forces Technical Services Agency, Edmonton

The network of Canadian Forces Technical Services Agencies (CFTSA) across Canada is responsible for various technical support services including quality repair of equipment and the inspection of certain materials purchased by the department to ensure their high standards.

Defence Research Board

Defence Research Establishments, Suffield, Ralston

The establishment has included in its research program new areas of defence interest where knowledge of techniques acquired from work on nuclear, biological and chemical defence is directly applicable. Two of these new areas are military preventitive medicine and military use of slurry explosives.

Tests were performed on personnel stationed in the Arctic to determine if pathogenic organisms, which are normally incapable of producing disease in populated areas, could present a hazard to the Canadian Armed Forces during northern operations. The feasibility of commercial slurry explosives for military applications has been investigated in conjunction with the Defence Research Establishment, Valcartier. It has been found that for cratering purposes a slurry explosive should be as effective weight-for-weight as a plastic explosive but at one-seventh the cost.

The establishment is developing simulated chemical agents and applicators and training personnel how to react against chemical attack.

Federal Scientific Establishments in SASKATCHEWAN, 1973

1. AGRICULTURE

Research Branch

Experimental Farm, Indian Head

This farm was one of the first to be established in the Research Branch. It is primarily concerned with the interests and problems of farmers in southeastern Saskatchewan, and research on crop and soil management and soil fertility is the main interest. Project farms provide additional facilities for work on improved general farms practices under various soil and climatic conditions.

Some research topics investigated recently were rotations and soil fertility, rates of seeding, fertilizers, cereals and forage crops.

Research Station, Melfort

The Melfort Station serves one of the largest and potentially most productive and diversified agricultural areas in Canada. The station specializes in developing better systems for producing, harvesting, and utilizing forage crops and has an extensive research program on the production and utilization of cereal, oilseed, and special crops.

Research Station, Regina

Regina is the centre for weed research in the Prairie Provinces. It deals with problems of cultural and chemical control of weeds in various crops and on native grasslands, with problems of effective application of chemicals, and with the fate of chemicals in the plants and in the soil. Work on the biological control of weeds was formerly conducted at the Research Institute, Belleville, Ontario, but was transferred to Regina where it could be more easily integrated with other weed programs.

Seed of new varieties of cereal, forage, and oil crops developed by the Branch is distributed from the station.

1. AGRICULTURE (cont'd)

Research Station, Saskatoon

The Station is an important centre for crop production and crop and animal protection. Entomologists pursue intensive studies on grasshoppers, wireworms, black flies and mosquitoes including basic research on insect nutrition, physiology and ecology, the application of pesticides and their residues in crops and soils.

There is also a program involving the study of roots rots of cereals and forage crop diseases. Attention is focused on the development of oilseeds, particularly rapeseed, and on breeding forage crops, including alfalfa and sweet clover.

Research Station, Swift Current

The Research Station, Swift Current, is concerned primarily with agricultural production problems of the most arid area of Western Canada. Throughout the region, cereal grains are grown on a variety of soils, and cattle are raised in large numbers on natural grasslands and on grass-alfalfa mixtures. Research is focused on improving the economy and stability of all forms of agricultural production.

Soil studies on dry land, related to moisture conservation and the control of wind and water erosion, combine the work of soil physicists, soil chemists, agrometeorologists and agricultural engineers. Research is conducted on various phases of irrigation, such as drainage and seepage, irrigation methods and crop management. New varieties of drought-tolerant grasses and legumes are under development and improved methods of managing these crops under dryland conditions are being studied. Research on the breeding, physiology and management of cereal crops is progressing. Turkey nutrition studies resulted in the formation of a new ration that reduces the number of days to market weight and the amount of feed per bird.

9. ENERGY, MINES & RESOURCES

Earth Sciences Program

Prince Albert Satellite Station, Prince Albert

The operational responsibility for this station was transferred from the Communications Research Centre to the Canada Centre for Remote Sensing. The Earth Resources Technology Satellite (ERTS 1), launched in 1972, was to provide by remote sensing a monitoring of air, water, land, forest and crop conditions. The program has applications in geology, hydrology and soil studies.

The Prince Albert Station is used for the reception and recording of data from ERTS 1. It has been recording on broad-band magnetic tape all of the imagery of Canadian terrain taken to date. The data is shipped to Ottawa where both colour and black and white photos in corrected and uncorrected form are produced and archived.

A "quick-look" imagery system at Prince Albert allows rapid viewing of the data coming in to check station performance.

10. ENVIRONMENT

Environmental Services Program

(Environmental Management)

Water Management Service, Regina

The Inland Waters Directorate operates five regional offices in Halifax, Montreal, Burlington, Regina andVancouver. The office in Regina comprises sectors of the Water Survey of Canada and the Water Planning and Management Branch.

The Water Survey of Canada maintains Canada's national network of streamflow water level and sediment transport stations. Water samples are collected at many of the stations for quality analysis. Snow and glacier surveys are carried out and flood forecasts provided in cooperation with some provincial agencies.

10. ENVIRONMENT (cont'd)

The Water Planning and Management Branch concerns itself primarily with comprehensive water resource planning throughout Canada. It cooperates with provincial agencies in implementing programs under the Canada Water Act.

Canadian Wildlife Service, Saskatoon

Areas of interest within the last three years have included duck and goose management - surveying, banding, mortality studies, and enforcement; crop damage by waterfowl; land acquisition and habitat evaluation, particularly in the Peace-Athabasca areas; waterfowl research - population dynamics and the development of new methods of assessing populations and habitats and the impact of the development of river basins on wildlife.

20. NATIONAL RESEARCH COUNCIL

Prairie Regional Laboratory, Saskatoon

The research in this laboratory is oriented towards measuring and controlling the influences of genetics, environment and physiological age on the growth and reproduction of microorganisms, yeasts, algae, plant cells and higher plants. Fundamental studies are directed to providing the necessary groundword for practical and applied research in agricultural production and the associated industries. The laboratory has been organized into four sections, microbial physiology and biochemistry, plant biochemistry, chemistry of plant products, and biotechnology.

The approach to many of the activities has been interdisciplinary and several of the activities involve inputs by other government research laboratories, industries and university departments.

Rapid and accurate methods have been developed to study nitrogen fixation by the enzyme nitrogenase and a simple and inexpensive procedure has been designed in conjunction with the regular analysis. Progress has been made in the research on cell fusion and embryogenesis in plant cells and the work has been extended by fine structure studies using electron microscopy. A selective breeding program for field peas promises a potential for increase in protein production. Some activities in regard to tree breeding and utilization

20. NATIONAL RESEARCH COUNCIL (cont'd)

of coniferous woods by the forestry industry are in progress.

23. REGIONAL ECONOMIC EXPANSION

The Prairie Farm Rehabilitation Administration is a federal agency serving the agricultural areas of the Prairie provinces in the fields of land use adjustment and water development.

In the area of water development it operates and maintains various irrigation projects and the Demonstration farm at Outlook, Saskatchewan which is associated with the South Saskatchewan River project.

Federal Scientific Establishments in MANITOBA, 1973

1. AGRICULTURE

Research Program

Research Station, Brandon

Research at the Station emphasizes animal breeding, animal physiology; plant breeding, physiology, management, soil-plant relationships, cultural practice, crop rotations and weed control.

Highlights for the year 1972 included the completion of phase one of the evaluation of foreign breeds of beef cattle involving topcrossing with sires of foreign breeds, and the start of phase two, the evaluation of hybrid females for beef production. Development of a new barley variety with high yield potential and malting quality continued.

Research Station, Morden

The Station consists of three sections: special crops, vegetable crops and ornamentals and fruit.

The breeding, management and diseases of buckwheat, corn, field peas, flax and sunflowers are the main concern of the special crops section. Many varieties from all over the world are evaluated for their suitability to Canadian conditions and the requirements of the industry in the area.

In the vegetable section one of the activities is the assessment of new crops for commercial purposes. Also of importance are continuing breeding programs for potatoes, cucumbers, tomatoes and sweet corn.

Breeding research in ornamental flowers results in the classification and evaluation of many varieties.

1. AGRICULTURE (cont'd)

Research Station, Winnipeg

The organization of the station has undergone some changes recently which reflect the emphasis being placed on certain activities. For instance, the Integrated Pest Control Section was established to develop pest management systems that optimize cost-benefit relations and minimize environmental degradation. This was prompted by increasing concern over the major insect pests of field crops in Western Canada.

Other sections of the Station include cereal rusts, crop protection and cereal diseases.

Breeding programs in wheat, oats, and barley are aimed at improving not only crop yield but resistance to disease and in the case of barley, promising malting quality. Researchers include plant breeders, geneticists, pathologists and cereal chemists.

Animal surveys of field crop insects are conducted to assess the problem and the effect of various control measures. Trapping devices for detecting insects in stored grain are used and analyses performed to determine the source and movement of these pests.

Health of Animals Branch

Laboratory, Winnipeg

The work of the Winnipeg laboratory is devoted to the testing and diagnosis of local animals for the department. Along with other laboratories across the country, it conducts research and investigations on diseases of animals and supplies the biological products required in the control programs of the Branch.

Federal Scientific Establishments in MANITOBA, 1973

1. AGRICULTURE (cont'd)

Canadian Grain Commission

Grain Research Laboratory, Winnipeg

The Laboratory conducts surveys of the quality of each year's grain crops and of grain moving through the Canadian elevator system. It provides information on the quality of assorted varieties and grades of grain to the inspection division, collaborates with plant breeders in studies on new grain varieties and undertakes basic research in relation to quality characteristics of cereal grains and oilseeds. For example, the Research laboratory recently established facilities to determine the erucic acid content of new varieties of rapeseed which were grown for the first time by Western Canadian farmers.

With the introduction of the protein factor in segregating wheat grades, the laboratory extended and decentralized its protein-testing facilities and is now able to test samples drawn from carloads of wheat and make the results known to terminal elevator operators prior to unloading cars at the terminals.

2. ATOMIC ENERGY OF CANADA LIMITED

Whiteshell Nuclear Research Establishment (WNRE), Pinawa

WNRE is specifically oriented toward investigation of materials for advanced nuclear reactors. The establishment's research reactor, the organic cooled WR-1, is undergoing modifications to increase its neutron flux and improve the flexibility and capacity of the reactor to deal with experimental programs.

Also under investigation are liquid metal coolants which offer higher temperatures than the organic coolants now used on the reactor.

A terminal unit and data-link at Whiteshell provide the Establishment with direct access to Chalk River Nuclear Laboratory's powerful computer system. Otherprojects at Whiteshell include work on radiation field

2. ATOMIC ENERGY OF CANADA LIMITED (cont'd)

measurement techniques in confined spaces (such as inside reactor cores), investigation into fundamental biological mechanisms and the effect of radiation (especially low-dose exposure) on them, and materials research - particularly oriented towards fibre reinforced ceramics.

10. ENVIRONMENT

Fisheries and Marine Program

Freshwater Institute, Winnipeg

The Freshwater Institute is responsible for research related to Canada's lakes and rivers and their freshwater fishery resources. It conducts programs in environmental research related to protecting and improving the quality of the aquatic environment: to provide the fundamental ecological understanding necessary to prevent degradation of Canadian freshwater ecosystems; to determine the extent and degree of pollution of fresh waters; to determine the effects of pollutants on fish and other aquatic organisms and the biological transformations and transport of such substances in the ecosystem; to develop new analytical techniques for detection and surveillance of freshwater pollution; and to develop methods for prevention of water pollution and restoration of polluted fresh waters.

In addition to the environmental research conducted, research in fisheries is aimed at deriving the maximum benefits from commercial and recreational fisheries at lowest cost: to provide a sound basis for improved management of fisheries on natural fish populations for maximum sustained yields; to develop fish farming and other aquaculture methods to increase the fisheries resources; to discover and develop new and improved fish products; and to improve the handling, storage and processing techniques of fish products.

Environmental Services Program

(Atmospheric Environment Service)
Central Regional Headquarters, Winnipeg

This regional office of the Atmospheric Environment Service coordinates the climatological observations of the stations in its district. With the use of "mini-computers" it can not only automate the data filing and display in an office, but also provide analyses and prediction on a regional scale.

(Environmental Management Service)
Canadian Wildlife Service, Regional Office, Winnipeg

As with most wildlife service establishments, the Winnipeg unit conducts surveys and banding of migratory birds, promotes law enforcement, and issues scientific and propagation permits. In addition, specific studies are undertaken on Canada geese, nest recording, research and planning in the national parks, biotic communities in national parks, limnology, pathology and toxic chemicals in food chains.

20. NATIONAL RESEARCH COUNCIL

Fort Churchill

Fort Churchill is part of the Space Research Facilities Branch whose function is to develop and provide facilities to meet the needs of the upper atmosphere and space research programs of Canadian scientists in universities and government agencies. At present, its work is restricted primarily to the use of sounding rockets, and the Churchill Research Range is the major launching site. The range, completely Canadian since July 1970, can launch various types of sounding rockets and balloons carrying scientific experiments to investigate the earth's upper atmosphere, track by radar and recover data at the telemetry ground station. Associated ground-based instruments are available to study the aurora borealis by photographic and spectra-photometric methods. Fort Churchill supports a continuing program for the Atmospheric Environment Service of the Department of Environment and the World Rockey Network.

20. NATIONAL RESEARCH COUNCIL (cont'd)

Regional Station, Building Research Division, Thompson

The Division of Building Research operates a small regional station at Thompson, which deals with research on permafrost and related contruction problems. Other regional offices of the Division are located across the country to carry out studies of local interest and serve as information offices.

Field Office, Technical Information Service, Winnipeg

The Technical Information Service (TIS) of NRC is concerned with providing medium and small-scale manufacturers with technological information sources and helping them identify and solve their problems. The central group in Ottawa provides technical support for 11 field offices that are strategically located near industrial concentrations. TIS answers generally summarize the state of the art as it relates to the problem, refer to selections of pertinent information, and where possible, propose a solution.

26. VETERANS AFFAIRS

Deer Lodge Hospital, Winnipeg

Research is geared extensively to geriatrics with specific programs on bronchitis, tumors and hypertension.

Federal Scientific Establishments in ONTARIO, 1973
(excluding Ottawa)

1. AGRICULTURE

Research Branch

Research Institute, Belleville

Research is concentrated on the reduction of weed or pest damage with minimal use of chemicals. Pest ecology, behaviour and physiology are examined and studies made of fecundity, mortality or stress imposed by natural enemies of pests or nutritional imbalance, and the choice of food or hosts by insects. The institute imports, quarantines, and dispatches organisms for biological control purposes.

Research Station, Delhi

The Research Station at Delhi has specialized in the production of flue-cured tobacco for 40 years. Emphasis is now being placed on tobacco and health and, in conjunction with the Canadian Tobacco Manufacturers Council, studies are being performed on the production, harvesting and curing of tobacco with the objectives of reducing the biological activity of tobacco when smoked; reducing the cost of production; and improving mechanization.

Research Station, Harrow

The activities of the Station are directed to the agricultural problems of crop production in south-western Ontario. The station comprises five sections - Chemistry and Weed Science, Crop Science, Entomology, Horticultural and Soil Science and Plant Pathology. Activities include: the breeding of and diseases associated with cereal and forage crops, vegetables and tree-fruits; studies on soil fertility and irrigation; pest control and pesticide testing.

1. AGRICULTURE (cont'd)

Research Branch

Experimental Farms, Kapuskasing, Smithfield, Thunder Bay

These three experimental farms are associated with the Research Station, Ottawa. Thunder Bay activities are primarily related to the adaptation and management of field crops in northwestern Ontario. The farm at Kapuskasing is concerned with crop management in northeastern Ontario and northwestern Quebec, and with the nutritional requirements and overwintering of beef cattle. The activities of the Smithfield farm concern trees, small fruits and vegetables, particularly canning crops - their management, breeding, physiology, and processing.

Research Institute, London

The Research Institute at London deals with plant pests, plant diseases, weeds and environmental quality.

Its activities include studies on the mode of action and use of toxicants (fungicides, herbicides, and insecticides). With the current pressure to replace persistent pesticides it is becoming important to discover alternative pesticidal materials and determine any deleterious side effects of these substances so as to minimize their effect on the environment.

Studies continue to isolate and characterize biologically active materials such as toxins associated with plant pathogens and insect attractants and repellants that may have potential in crop protection.

Research Station, Vineland

The research station, Vineland, is concerned with methods of protection for fruit and vegetable crops in the area, and the study of diseases and insects affecting crops.

Federal Scientific Establishments in ONTARIO, 1973.

1. AGRICULTURE (cont'd)

Research Branch

Research Station, Vineland (cont'd)

Programs involving pesticides include pesticide evaluations, integrated control methods and assessment of pesticide sprayers.

The station is responsible for obtaining and maintaining virus-tested, true-to-name cultivars of tree-fruits, grapes, strawberries and raspberries. Research continues on the biology and control of nematodes that attack vegetables, fruit trees, tobacco, and forage crops.

Health of Animals Branch

Laboratory, Guelph

Mainly a service centre for the testing of local animals for brucellosis, the centre directs most of its activities to the needs of the Health of Animals branch. Limited research is done on the marketing of meat products and on pesticide residues.

2. ATOMIC ENERGY OF CANADA LIMITED

Chalk River Nuclear Laboratories (CRNL), Chalk River

In conjunction with Whiteshell Nuclear Research Establishment, (WNRE) Pinawa, Manitoba, Chalk River Nuclear Laboratories (CRNL) provide research and development activities for AECL. Programs at these two sites are closely coordinated and special emphasis is given to supporting the current and near-term needs of nuclear power.

A quality control branch of CRNL has as its long-term objective to measure the life-time deterioration of plant components with sufficient accuracy to

2. ATOMIC ENERGY OF CANADA LIMITED (cont'd)

permit replacement or repair in a predictable and efficient manner. Another involvement of CRNL is in the design of Advanced Nuclear Systems which, although not currently economic, may prove beneficial in the future.

CRNL participates in many projects with the Commercial Products group of AECL in developing new and improved applications of radiation and radioisotopes.

CRNL at Chalk River is an extermely large establishment with two large research reactors (designated NRU and NRX), three small reactors and a tandem Van der Graaff accelerator.

Power Projects Group, Sheridan Park

The power projects group is responsible for nuclear power system design, nuclear consulting services, development and testing of major equipment items for nuclear power plants and the project management of the Douglas Point and Gentilly Nuclear power stations and the Nelson River transmission system.

The design office of Power Projects has worked on reactors that are being used abroad, namely the Cordoba reactor in Argentina and the ENEL-5 in Italy.

Power Projects has been assisting Ontario Hydro in studies related to the utility's future nuclear power program.

Federal Scientific Establishments in ONTARIO, 1973

9. ENERGY, MINES & RESOURCES

Mineral and Energy Resources Program

Laboratory, Elliot Lake

The laboratory is one of five research laboratories of the Mining Research Centre which assists the mining industry in achieving increased productivity, improved safety, better use of mineral resources and improvement of the environment.

Research is conducted in underground mining problems. Particular attention is paid to the stability of mines and the environment in mines - problems of dust, radioactivity and noise. Some effort is directed to the development of underground communications and also to revegetation programs over tailings.

10. ENVIRONMENT

Fisheries and Marine Program

Great Lakes Biolimnology Laboratory, Burlington

This unit, formerly administered by the Freshwater Institute at Winnipeg, focuses on three main areas. The first of these is Descriptive Biolimnology, which includes surveys, surveillance and work on taxonomy and developmental cycles of phytoplankton, zooplankton and bottom fauna of the Great Lakes. The second area, Environmental Toxicology, emphasizes the effects of toxic substances, such as pesticides and trace metals, and of waste dust on aquatic life. The third area, Ecosystem Metabolism, emphasizes primary and secondary production in lakes and effects of environmental stresses on production dynamics.

Several components of the Department of the Environment make up the Canada Centre for Inland Waters at Burlinton; the Great Lakes Biolimnology Laboratory is one.

10. ENVIRONMENT (cont'd)

Canada Centre for Inland Waters

Great Lakes Biolimnology Laboratory	-Fisheries Management and Research	FISHERIES AND MARINE PROGRAM
Marine Sciences Directorate (Central Region)	-Marine Sciences	
Technology Development and Demonstration Division	-Environmental Protection	ENVIRONMENTAL SERVICES PROGRAM
Environmental Emergency Branch	-Environmental Protection	
Inland Waters Directorate (Ontario Branch)	-Environmental Management	

Marine Sciences Directorate (Central Region), Burlington

This unit is comprised of three components. The first, the Canadian hydrographic Service, gathers, processes and compiles bathymetric (measurement of depths of water) data and marine information on the navigable waters in the region and conducts surveys necessary for the management of water resources and the protection of the marine environment. The major project of 1972 was the participation in the International Field Year for the Great Lakes (IFYGL) study of Lake Ontario and Basin. In the James Bay area, increased interest in hydro-electric projects prompted a hydrographic survey to provide safe access routes for freighters and tankers. Other involvements of the Canadian Hydrographic Survey were with the Polar Continental Shelf Project, lower St. Lawrence Survey, Lake of the Woods survey and Hamilton survey, among others. The Hydrographic Development Group was involved in evaluation of positioning systems, sonar development and an evaluation of private industries' capabilities in conducting hydrographic surveys.

The second component of the Directorate is the Ship Division which provides and operates the ships, launches and other marine craft required by the hydrographic surveys and programs.

The Geotechnology Section, the third section of the Centre, has as its prime function, the provision of tidal, current, and water level support for hydrographic surveys. It is also responsible for planning and organizing the oceanographic programs to be included in regular hydrographic surveys.

10. ENVIRONMENT (cont'd)

(Environmental Protection Service)
Technology Development and Demonstration Division, Burlington

This division is charged with the conception, development, and implementation of technical development programs related to water pollution control for industrial and municipal wastewaters. It undertakes pilot scale studies in its own laboratories and participates in field demonstration projects at industrial sites.

The Wastewater Technology Centre at the Canada Centre for Inland Waters is organized into four sections. The Process Development Section examines biological and microbial aspects of water pollution, methods of disposal of effluents using soil systems and chemical removal of harmful constituents of effluent waste streams.

The Demonstration Section implements and monitors experimental programs in the field. Laboratory Services provide the analytical support to the bench scale, pilot plant and field projects of the Division.

The Environmental Emergency Branch is responsible for protective and preventive activities where an environmental threat results from an accident in which a hazardous chemical is released into the environment. The Hazardous Material Spill Countermeasures Unit is the national centre for evaluation and development of systems for dealing with oil and other toxic materials.

Inland Waters Directorate (Ontario Region), Burlington

The Directorate at Burlington includes four research components: Hydraulics Division, Lakes Research Division, Social Sciences Research and Water Quality Branch Research. In addition it serves as the coordinating agent for the activities of all sectors of the Canada Centre for Inland Waters.

The Hydraulics Division is responsible for the inception and implementation of a research programme in hydraulics including fluid dynamics, sediment transportation, wave dynamics and ice and cold weather hydraulics. It is also responsible for the operation of a national calibration service for hydrometric instruments, particularly current meters. The emphasis in the Division is to provide estimates of the changes in regime (regular seasonal patterns) and to seek the most efficacious practice and design methods which will mitigate environmental changes. Studies have included waste heat disposal in rivers and methods of reducing pollution from combined storm and sanitary sewer systems.

Inland Waters Directorate (Ontario Region), Burlington

The Lakes Research Division, through its various subdivisions - Lake Resources, Geophysical Limnology, Biogeochemical Limnology, Microbiology and Technical Operations - carries out research to provide the knowledge necessary for managing the freshwater resources stored in lakes in Canada. The Lake Resources Subdivision studies such topics as the chemical constituents of the waters, the rate of settling and flux of organic particles, current flow measurements, meteorological data to compute wind stress, evaporation and heat transfer and a remote sensing program involved with the International Field Year for the Great Lakes (IFYGL) on Lake Ontario. Regional Laboratories conducted dynamic studies of small lakes near Kenora and participated in the federal-provincial Okanagan Basin Study.

The Geophysical Limnology subdivision deals with nearshore sediment distribution, composition and movement and basic physical processes affecting the distribution of energy and materials across the surface and within lakes. The Biogeochemical Limnology subdivision carries out studies on the impact of introduction of natural and man-made substances into lake systems and provides the fundamental understanding of chemical processes in lake waters as a basis for water quality management. Areas of concern for the Microbiology subdivision include detergent and hydrocarbon degradation studies, bacteriological studies of the St. Lawrence from Kingston to Cornwall, bacteriological study of the Indian Reserve drinking water supply and microbiological support for a variety of CCIW projects.

Canadian Wildlife Service, Aurora, Midland

Activities in Ontario include aerial surveys to determine waterfowl on the southern wetlands, a duck population index survey, photographic surveys of diving ducks to determine their numbers, the banding of migratory birds, law enforcement, a nest record program of non-game birds, and marshland evaluation and acquisition. Specific studies have included the distribution of duck kill, bird damage to fruit in the Niagara Peninsula, bird hazards to aircraft, polar bear dynamics, limnology, pathology, and toxic chemicals.

Midland serves as an interpretation centre for the Wildlife Service. The facilities include 2500 acres of marsh, forests, and old fields owned by the province of Ontario; a public information/education program is promoted through exhibits, literature, films, and nature trails.

Federal Scientific Establishments in ONTARIO, 1973

10. ENVIRONMENT (cont'd)

Petawa Forest Experiment Station, Chalk River

This station is one of the oldest forest research establishments in Canada. Silviculture research began here in 1918 with the setting up of some of the first sample plots in the country.

Current research covers methods of treating stands to improve growth rate and quality. Geneticists are studying the genetic basis for improvement of pines and spruces with a view to designating the best seed sources and breeding superior trees. Physiologists are examining ways of screening seedlings for adult growth characteristics and are developing growth acceleration systems for growth rooms and greenhouses. A seed unit produces source-identified tested seed for research purposes and provides information on seed availability.

Research in harvesting is being conducted, especially in "amenity harvesting", to investigate the cost of cutting a forest stand in such a way as to minimize the visual impact.

Water Survey of Canada, Guelph

Water resources data on flows, water levels, reservoirs, and sediment samples from a total of 364 gauging stations are collected and published. Additional studies are carried out on network design flow forecasting, and data analysis.

Great Lakes Forest Research Centre, Sault Ste. Marie

The research conducted here complements the activities of the Pacific Northern, Laurentian, Maritimes and Newfoundland Forest Research Centres, which together serve all of Canada. The objectives are improved forest management and the welfare of the forest industries. Areas of

10. ENVIRONMENT (cont'd)

Great Lakes Research Centre (cont'd)

research include silviculture, tree biology, entomology, forest pathology, forest fire control, and forest management.

Close liaison is maintained with provincial authorities and with industry.

Insect Pathology Research Institute, Sault Ste. Marie

Research is conducted at the Institute to lead to a comprehensive understanding of the biology and ecology of the more destructive forest insects. Under study are the fundamental principles of insect pathology and pathophysiology, their influence on natural populations and the possibility of manipulating them so as to reduce the damage caused by destructive insects.

Emphasis has continued to be primarily on fundamental problems associated with the four major groups of pathogens - the bacteria, the fungi, the protozoa, and the viruses. By introducing these pathogens into an insect population, it may be possible to either control or eliminate them entirely.

Besides the introduction of pathogens, studies are being conducted of the secretions produced and used by insects for communications, especially the sex attractants. They may be used as lures or to develop masking compounds that will interfere with the communication. The possibility of exercising control of populations by interfering with the reproductive processes is being investigated.

10. ENVIRONMENT (cont'd)

(Atmospheric Environment Service)
Headquarters, Downsview

Most of the research, training and instrument development programs of the Service are carried out in the headquarters at Downsview, which brings together all the units that were previously dispersed throughout Toronto. It also serves as the administrative centre for the Service and is the Canadian centre for climatological data. The building houses a 96 foot wind tunnel, a satellite data laboratory and receiving station, data processing computers, communications links with national and international meteorological circuits plus advanced facilities for all types of atmospheric research.

The Atmospheric Environment Service is mainly interested in operational programs designed to provide information on current and predicted meteorological conditions and on the Canadian climate, and to carry out and promote research on atmospheric behaviour.

17. NATIONAL DEFENCE

Defence Services Program

Canadian Armed Forces Technical Services Agency, Toronto

This unit, one of a network for the forces across Canada, is responsible for the supervision of defence contracts, the insuring of quality standards in the repair of equipment and the evaluation of materials purchased by the Department.

Defence Research Board

Defence and Civil Institute of Environmental Medicine, Downsview

The Institute studies the characteristics, capabilities and limitations of man in hostile environments as well as the human factors inherent in engineering systems. This knowledge is applied to the effective design and development of man/machine systems for use in adverse environments. The Institute consists of

17. NATIONAL DEFENCE (cont'd)

approximately 40% military personnel.

Several of the programs are devoted to extending man's capabilities in adverse environments, for instance increasing underwater diving capabilities in both depth and duration of dive. Also of interest are the physiological and equipment problems of working in the Canadian north, and the study of human perception and performance to elucidate man's methods of selecting and processing information for efficient operation in a complex military environment.

20. NATIONAL RESEARCH COUNCIL

Algonquin Radio Observatory, Lake Traverse

Canada's national radio astronomy observatory is situated in Algonquin Park in Ontario. The site was chosen for its freedom from man-made radio signals which interfere with weak natural emissions of the universe.

A permanent staff of engineers and technologists is responsible for the maintenance of the equipment and similar groups in Ottawa are responsible for the development of new receivers and for the design and implementation of a computer operated data acquisition and telescope control system.

The observatory's major instrument is the 150-foot diameter paraboloidal reflector, a giant dish that is among the world's most powerful telescopes at centimetre wavelengths. The first detection of radio emission from an x-ray star was made with this telescope. Other instruments at the observatory include a general purpose 10 metre paraboloid, a horn reflector used for absolute measurements of the intensity of radio sources and two telescopes designed specifically for studies of the sun. Routine daily observations of the solar flux have been made for over 20 years at the Algonquin Radio Observatory. These data are accepted internationally as an index of solar activity.

Federal Scientific Establishments in ONTARIO, 1973

20. NATIONAL RESEARCH COUNCIL (cont'd)

Building Research, Toronto

The Building Research unit in Toronto performs no research. Rather, it serves to provide direct liaison with the extensive construction activity in this major metropolitan area. This unit is one of five regional stations.

Technical Information Service, Toronto

The Technical Information Service consists of a central group in Ottawa providing technical support for eleven field offices which are strategically located near industrial concentrations. TIS answers problems from small and medium-scale manufacturers and the answers generally summarize the state of the art as it relates to the problem, refer to selections of pertinent information, and, where possible, propose a solution.

24. ST. LAWRENCE SEAWAY AUTHORITY

Headquarters, Cornwall

In addition to serving as a part of the administration, operations analysts in Cornwall examine methods of extending the navigational system, developing a system of traffic control and reducing the lock cycle.

Saint Catherines

This unit is primarily operational and contributes to the maintenance of the system. However, when required by the engineering division, the Saint Catherines unit will conduct field research for the acquisition of data needed in studies.

Federal Scientific Establishments in the NATIONAL CAPITAL REGION, 1973

1. AGRICULTURE

Administration Branch

The Departmental library houses the most up-to-date and comprehensive collection of bio-agricultural and related publications in Canada. It is the official Canadian depository for publications of the Food Agricultural Organization (FAO) of the United Nations, and the U.S. Department of Agriculture.

The library utilizes computer recording and storage of information and is connected to the National Science Library's CAN/SDI (Selective Dissemination of Information) program. Agriculture is cooperating with the FAO in establishing an international information system for agricultural science and technology.

Research Branch

Animal Research Institute

The Institute conducts a broad program of research aimed at increasing the productivity of Canadian livestock and poultry and improving the quality of such animal products as meat, milk, and eggs.

The research is conducted by six program related sections:
- Dairy Cattle Breeding
- Poultry and Sheep Breeding
- Monogastric Nutrition
- Ruminant Nutrition
- Trace Minerals and Pesticides
- Reproductive Physiology

The breeding programs involve field tests with departmental animals for evaluation and selection of cross-breeding. Genetic studies of the animals for resistance to disease and other inherited traits are essential to this program.

1. AGRICULTURE (cont'd)

Animal Research Institute (cont'd)

The nutrition sections deal with two categories of animals: monogastric, having one digestive tract (swine, chicken), and ruminant animals such as sheep and cattle. Different diets are prescribed in an attempt to effect either a certain growth characteristic or other desirable aspect of an animal's development.

In the Trace Minerals and Pesticides section, the presence of assorted elements in the tissues of animals is investigated for any effect on the animal.

Chemistry and Biology Research Institute

This Institute is a recent amalgamation of the Analytical Chemistry Research Service and the Cell Biology Research Institute, and is actively engaged in research on a variety of topics including:
- winter survival of plants and seed dormancy
- reduction of plant diseases by investigation of host-parasite interactions of viruses, mycoplasmas, bacteria and fungi with crops
- development of new plant hybrids by using bioengineering techniques
- development of new chemical methodology, particularly for analysis and recovery of pesticide residues.

Other Agricultural Research Branch establishments benefit from the comprehensive technical service in analytical chemistry which is provided by the Technological Services Unit. The Instrumentation Centre also is able to provide sophisticated equipment and a competent staff to other members of the Branch. Finally, the Electron Microscope Centre, with its new postal service, is able to analyse specimens for establishments from all over the country.

1. AGRICULTURE (cont'd)

Entomology Research Institute

The Institute provides the National Identification Service for Canada on insects, arachnids, and nematodes. The number of specimens identified in 1972 exceeded 90,000,with over 40% being submitted by the Department of Environment, and the rest from other federal and provincial departments, universities, industry and other countries.

To meet this responsibility of identification the Institute carries out extensive research in taxonomy, biosystematics, and faunistics (zoogeography). Of special interest are insects which have a pronounced effect, either harmful or beneficial, on crops or animals. The Institute produces a series of handbooks for identification purposes.

Food Research Institute

The principal role of the Food Research Institute is to obtain and apply knowledge of food composition, quality and processing techniques to Canadian agricultural crops and dairy products.

Three areas are being emphasized:
- research on milk protein to determine its nature, reactions and uses
- studies of vegetable proteins to determine how they can be prepared for direct human nutrition
- research on the effects of vegetable and dairy proteins on animal nutrition and meat quality.

The staff includes specialists in microbiology, food processing, sensory analysis, chemistry and biochemistry.

Plant Research Institute

The Institute serves as Canada's main centre for the taxonomic study of higher plants and fungi, and its two herbaria contain the best national reference collections of the flora of Canada. Requests for identification services have increased substantially in recent years due to a greater emphasis on environmental research by various agencies.

1. AGRICULTURE (cont'd)

Plant Research Institute (cont'd)

The Institute provides a reference work of oat cultivar names and is using the computer system to develop a similar register for other cultivated crops.

Ornamental horticulture research at the Institute involves the evaluation and identification of the plants as well as studies on the reactions of the plants to physical and chemical changes in their environment.

An Agrometeorology Section of the Institute researches the measurement of the effect of weather and climate on soils and crops.

Soil Research Institute

Soil resource and soil conservation research are the two wide topics of concern to the Institute. It investigates the chemical, physical, and biological factors that control the availability and supply of nutrients and soil moisture.

In the Soil Resource Program, work has been expanded on soil correlation, interpretations and applications of soil information, and remote sensing. The Soil Conservation Research program includes studies on urban and animal waste disposal, metal reactions, nutrient accumulation and transmission and other activities related to soil quality.

Regional programs have been maintained through the Soil Survey units whose activities are correlated by the Institute.

Engineering Research Service

The Service supports biological research and agricultural production by conducting studies of new engineering concepts, systems and equipment. It provides advisory and consulting services on such topics as building

design, drainage, irrigation and erosion control. The Research Service designs specialized equipment that reduces technical labour in research programs and provides instrumentation and control systems that permit precise research and improved data collection and analysis. The technical publication ERDA communicates agricultural engineering information to publicize current research and development programs in Canada.

Statistical Research Service

The objectives of this service are to improve the understanding of biological phenomena and agricultural practices, through the development and use of appropriate mathematical and statistical models, and to advise and assist scientists in planning and designing experiments, and analyzing and interpreting results. The service increases its library of computer programs regularly.

Research Station

The Station is located at the Central Experimental Farm and serves eastern Ontario and northern Quebec through associated experimental farms at Smithfield, Thunder Bay, and Kapuskasing.

The emphasis at the main station is placed on research on animal feed crops including cereal, corn and forage crops while research on treefruits and small fruits has either been concluded or transferred to other stations. Elements of the feed crop program consist of the breeding, growth and development, pathology and quality testing of wheat, oats, barley, alfalfa, corn and soybeans. The assessment of crop losses is conducted by means of aerial infrared colour photography.

Health of Animals Branch

Animal Pathology Division

The Animal Pathology Division carries on research into animal diseases, provides diagnostic and other services and acts as consultant on the registration, licensing and use of biologicals and other veterinary and

1. AGRICULTURE (cont'd)

Health of Animals Branch (cont'd)

Animal Pathology Division (cont'd)

pest-control products sold in Canada. Research is directed mainly at diseases that cause serious economic losses of livestock and those that may be transmitted to man. The division studies the causative agents of animal diseases and methods of transmission and is constantly developing and improving tests for detecting disease. It also produces diagnostic reagents and biological products to halt outbreaks of disease.

The two other divisions of the Health of Animals Branch, namely the Contagious Diseases Division and the Meat Inspection Division, use the diagnostic services of Animal Pathology, as do veterinarians, farmers, and provincial laboratories. For instance, thousands of samples of meats collected by the Meat Inspection Division are bacteriologically analysed each year.

2. ATOMIC ENERGY OF CANADA LIMITED

Commercial Products Group

The Commercial Products Group of AECL is responsible for developing new and improved applications for radiation and radioisotopes, the development and manufacture of related equipment and the worldwide marketing of products and services.

Medical products comprise about two-thirds of the total. Some recent examples of medical products include:
- linear accelerator therapy equipment
- medical diagnostic devices such as one to measure bone density and another instrument to identify abnormalities in organs
- batteries for heart pacemakers.

In cooperation with France, Commercial Products Group is developing a range of high energy accelerators for use in cancer treatment.

2. ATOMIC ENERGY OF CANADA LIMITED (cont'd)

One of the products in the non-medical field is the MAPLE (Minor Atomic Prolonged Life Energy) source which is one of a new breed of energy sources.

Heavy Water Projects

The office is responsible for various aspects of the use and design of heavy water facilities. A high priority is the development program to increase production of the Canadian General Electric Plant at Point Tupper, N.S. The office has been involved in the design of new facilities for the Glace Bay plant.

5. CANADIAN PATENTS AND DEVELOPMENT LIMITED

The objective of Canadian Patents and Development Limited is to market the products of publicly financed research and development. Activities include the assessment of inventions for patentability, application for international patents, licensing products to industry and collecting the royalities. The patents most frequently handled are for measuring and testing-type instruments.

7. COMMUNICATIONS

Communications Research Centre

Research in the Department of Communications is aimed at improving and expanding the telecommunications network and its services. Generally work undertaken at the Centre complements, or is performed in conjunction with,research done by private industry or universities.

A large part of the department's research effort has been directed towards a series of communications spacecraft programs, the most recent of which is the Communications Technology Satellite (CTS) due for launch at the end of 1975. This joint project with NASA in the United States will place an advanced

7. COMMUNICATIONS (cont'd)

technology communications satellite in orbit to carry out communications experiments during a two year mission life. The satellite will permit the use of relatively inexpensive communications ground terminals, suitable for deployment in small communities or by mobile parties operating in inaccessible regions. The design, fabrication and testing of equipment for the project involves members of industry, universities and the National Aeronautics and Space Administration.

Other communications systems research is conducted to investigate factors affecting long-distance propagation of radio-waves. In support of its advanced communications programs the centre conducts a considerable amount of advanced electronics and space mechanics work. Particular areas of interest include microwave systems and hardware, integrated circuitry and computer communications.

8. CONSUMER AND CORPORATE AFFAIRS

Consumer Affairs.

The Standards Branch of Consumer Affairs develops programs to ensure compliance with standards in its areas of responsibility. It participates in national and international standards development where consumer interest is involved.

The responsibilities of the Standards Laboratories for testing textiles, chemicals, and other hazardous products is expanding. More instrumental analysis is being performed and techniques are being improved for detecting toxic elements in consumer products including ceramics, cookware and toy finishes. The laboratory continues its activities in legal metrology in support of the Bureau of Field Operations' responsibilities under the Weights and Measures, Electricity Inspection and Gas Inspection Acts.

The Hazardous Products Division of the Standards Branch conducts intensive surveys of merchandise coming under the flammability regulations effectively removing dangerously hazardous articles of clothing and bedding from retail shelves.

8. CONSUMER AND CORPORATE AFFAIRS (cont'd)

Corporate Affairs

The Patent Office granted over twenty-six thousand patents in 1972-73 and the subject matter of inventions continues to be in consumer-demand areas. A new quality-audit trial project has been introduced which will result in the establishment of guidelines for a continuing quality control program, further improving the calibre of patent examination to ensure maximum protection to those who receive patents.

A weekly publication, the Patent Office Record, provides the public with a listing of all patents granted. New Patent News is a collection of brief resumés of recently-issued Canadian patents of interest to the general public and is distributed to the national news media.

9. ENERGY, MINES AND RESOURCES

Mineral and Energy Resources Program
(Mines Branch)

The Mines Branch activities comprise the identification of mineral deposits of economic interest; the production of raw materials by developing new mining technology; the processing and conversion of minerals, metals and fuels by improving methods for recovery and use; and the improvement of the environment by preventing or abating pollution arising from mining, metallurgical, and energy-producing operations.

These activities are conducted at eight centres:
- Mineral Processing
- Extraction Metallurgy
- Mineral Sciences

9. ENERGY, MINES AND RESOURCES (cont'd)

- Fuels Research
- Mining Research
- Metals Reduction and Energy
- Physical Metallurgy
- Technical Services

The functions of each of these centres are briefly described below:

Mineral Processing

The concern here is with the methods of processing minerals to afford the greatest utility and quality of these products.

Studies are conducted on ores to determine their usefulness or potential by chemical, physical and mechanical tests. Another section deals with the field of waste mineral utilization, and research progresses on primary processing of industrial minerals and their conversion into non-metallic materials. Improved concentration processes are the aim of the Minerals and Metals Technology group and the work is supported by a pilot plant which can evaluate proposed improvements.

Extraction Metallurgy

Various methods of extracting metals from their ores are investigated. Often processes are studied which would enable the extraction of metals which were too low-grade for conventional mining and processing. New technology is being developed to economically recover by-products from mill tailings and metallurgical wastes, effecting a substantial environmental improvement as well. In response to a perennial problem of the mining industry in Canada, namely metal corrosion in mill and underground environments, research is being conducted on surface coatings to control the sulphuric acid, soluble iron salts and sulphur dioxide.

9. ENERGY, MINES AND RESOURCES (cont'd)

Mineral Sciences

The centre is involved increasingly in environmental improvements and in the characterization of standard reference materials to provide fundamental information that will be of use to the Canadian mineral industry. In the field of X-ray crystallography, a number of accurate structural analyses have been performed. Standard reference materials are being made available to industry for the purposes of evaluation of analytical methods and the calibration of analytical equipment.

Investigations are made into methods for the reduction of the pollutant gas content of effluent gases from industrial operations. Also under study is the effect of slag heaps and tailings on the pollution.

Fuels Research

The Fuels Research Centre contributes to the Mineral and Energy Resources program in the following areas: the characterization of the quality of Canada's fossil fuel resources, the search for new methods of utilizing these resources to produce more energy efficiently, and finally the development of methods to reduce the atmospheric pollution caused by the use of these fuels.

In reducing atmospheric pollution two approaches have been taken. One involves the elimination of the sulphur and mineral contaminants before combustion; the other involves improving the combustion process to reduce the pollutants arising from combustion and the design of smoke stacks to ensure adequate dispersion of these toxic gases. The problem of mine atmospheres containing combustible gases requires the testing and certification of electrical equipment and diesel engines, the latter with respect to toxic-gas emission and safety.

9. ENERGY, MINES AND RESOURCES (cont'd)

Mining Research

The Centre works through its five research laboratories on its own research projects and participates in joint research projects with mining companies. Its research laboratories are: Canadian Explosives Research Laboratory, (CERL) and Rock Mechanics Laboratory, both in Ottawa, Elliot Lake Laboratory, the Western Office at Calgary and the Rock Breakage group at Quebec City.

The following sub-activities describe the Centre's work: ground control research, concerned with developing design criteria for mine excavations; rock breakage and explosives research to develop radically new mining methods; mine systems engineering; environmental control research; and development of control methods for pollution and health hazards in mines, including radiation.

Metals Reduction and Energy

The work of the Centre is performed through its four groups: Western, Regional Laboratory, Edmonton, for coal beneficiation; Metallurgical Fuel Engineering, Ottawa, for coal carbonization; Pyrometallurgy, Ottawa, for smelting improvements; and Special Studies, Ottawa.

One of the research projects is aimed at developing beneficiation processes for both high and low-ranking coals. Most of this work is conducted at the Western Regional Laboratory. The Metallurgical Fuel Engineering Group continues to serve the needs of the coal and coke industries of Canada by performing confidential evaluations of coals and cokes for individual companies and research projects jointly agreed upon by the Centre and the Canadian Carbonization Research Association. The pyrometallurgical research program utilizes the expertise gained in studying hot, combustible gases to handle the atmospheric pollution problems in the smelting industry.

9. ENERGY, MINES AND RESOURCES (cont'd)

Physical Metallurgy

Most of the activities are related to the conservation, processing, properties, and utilization of Canada's metals and to the fabrication of products from these metals. Emphasis is on applied research and development that require small-scale facilities for melting, casting, forming and fabricating.

The Centre conducts research in foundry mold design, the melting and casting of metals and alloys, new technology in forming and fabrication and the evaluation and improvement of metals and alloys. Under study in this last category are the design fabrication and performance of fuel transmission pipelines.

Another activity of the Centre is environmental improvement with the overall objective of preventing or abating pollution arising from the treatment or processing of minerals and metals.

Technical Services

Technical Services Division does design and fabrication in support of research and development activities in the Mines Branch. It also furnishes consultation, facilities planning, project management, and innovation capability in the industrial, mechanical, electrical, instrumentation, and control technologies.

Geological Survey of Canada (GSC)

The Geological Survey of Canada surveys the materials and attributes of the landmass of Canada, its composition, forms and natural processes as potential resources and conditioners of terrain use and development. Its program, broadly inventory in character, is directed to: understanding of the natural resource base; identification of resources; appraisal of the natural resource endowment, and determination of the environment of the resources. The resources to be appraised are largely non-renewable. They range from the

Federal Scientific Establishments in the NATIONAL CAPITAL REGION, 1973

9. ENERGY, MINES AND RESOURCES (cont'd)

extractive mineral and fossil fuel resources to the non-extractive materials and attributes of the terrain that condition landmass utilization and conservation.

The GSC is organized into seven divisions, five of which are in the National Capital Region. The remaining two are located at Calgary (Institute of Sedimentary and Petroleum Geology) and Dartmouth (Atlantic Geoscience Centre).

The divisions in the National Capital Region are:
- Geological Information Processing
- Central Laboratories and Technical Services
- Resources Geophysics and Geochemistry
- Terrain Sciences
- Regional and Economic Geology

Geological Information Processing

The principal objectives of the Division are the communication of the results of the scientific program of the Geological Survey to users; the maintenance of a scientific library and associated data systems and the provision of geoscientific information to the public. In support of these objectives, the Division maintains capabilities and facilities in scientific editing and information, cartography, library services, technical photography and publication distribution.

Central Laboratories and Technical Services Division

The Division maintains three major objectives: to provide the chemical mineralogical, instrumental and technical services and advice required by Branch scientific projects; to provide mineralogical information

9. ENERGY, MINES AND RESOURCES

Geological Survey of Canada (cont'd)

to the public; and to initiate and carry out the mineralogical, chemical and technical research and method development needed to meet previous objectives.

The Division comprises the following major sections:
- Analytical Chemistry
- Mineralogy
- Electronic Services and Equipment Development
- Mechanical Services and Instrument Development

Resource Geophysics and Geochemistry (RGG)

The Division contributes to the overall objectives of the GSC by the provision of discipline oriented special services, and by conducting research and development aimed at expanding the usefulness of these disciplines. The sections of this division are:
- Contract Surveys
- Electrical Methods
- Seismic
- Digital Compilation
- Magnetic Methods
- Geochemistry
- Radiation Methods
- Experimental Airborne Operations

Most of the aeromagnetic surveys are conducted on a contract basis. The compilation of the magnetic anomaly map of Canada and other similar documents related to the aeromagnetic survey program of GSC is performed by the Contract Surveys section.

The Electrical Methods section aims at facilitating the discovery and identification of the mineral and energy resources of Canada. The work of the section is in the prime area of electrical methods pertaining to mineral explorations, geological mapping and engineering problems. This section works closely with industry through experimental survey contracts and the development of geophysical instrumentation. More basic research is the project on the electrical characteristics of rocks and minerals.

9. ENERGY, MINES AND RESOURCES (cont'd)

The aims of the Seismic Section are directed towards operation, development, and assessment of a broad spectrum of seismic methods as an aid to the interpretation of geology in Canada.

The culmination of four years' work in the Digital Compilation Section results in the production of aeromagnetic contour maps by automatic computer methods.

The Magnetic Methods section is responsible for developing new magnetic survey instrumentation, and techniques, conducting and interpreting special aeromagnetic surveys over land and sea, devising new techniques for the treatment and interpretation of aeromagnetic survey data, and demonstrating the usefulness of magnetic survey data in geological mapping.

Possibly the major in-house project of 1972 for the entire Division was the Bear-Slave regional geochemical reconnaissance by lake sediment sampling, the first major geochemical reconnaissance of the Canadian Shield. The samples have since been analysed for some twenty-seven major and trace elements in the Geochemistry section's laboratories. The "birds-eye-view" of element distribution in the crust which the maps provide, show a number of features that may be used by mapping geologists for their interpretations. The data is significant to the environmental sciences since it provides information on background levels and variation of potentially toxic elements. Other geochemical studies of stream and lake sediments, water and soils are conducted.

The Radiation Methods Section is responsible for development and evaluation of survey techniques, particularly utilizing gamma radiation and visible and infrared portions of the spectrum. Activities of the section have been concentrated on airborne gamma-ray spectrometry and multispectral photography.

The Experimental Airborne Operations Section coordinates the operation of the two aircraft of the Division and supplies operational and research services.

9. ENERGY, MINES AND RESOURCES (cont'd)

Terrain Sciences Division

The Division provides geological, gemorphological and geotechnical information on terrain and its performance in order to promote effective use of the terrain, to identify and assess natural hazards, and to facilitate maintenance and restoration of the physical environment. The divisional program deals with surface and near-surface earth and rock materials, landforms, and associated stability relations and dynamic processes, and is designed to build up a geologically based fund of centralized knowledge and expertise concerning the terrain of Canada.

The scientific activities of the Division are carried out under the subdivisions, the Quaternary Subdivision and the Geotechnical Subdivision.

Quaternary Subdivision

Activities are directed towards a long-term goal for completion of standard surficial mapping of Canada accompanied by stratigraphic and associated subsurface studies in order to provide appropriate standards for interpretation and correlation.

One section handles regional projects to provide a Canada-wide inventory of the unconsolidated deposits and landforms. The information is of value to forestry, agriculture, engineering construction and the mineral industry and is used in land use and environmental impact studies. Analyses of fossil materials and radiocarbon dating are provided by the Paleoecology and Geochronology section. The Marine and Coastal Section provides information about the seafloor and coast for possible use in offshore and coastal engineering planning, environmental studies, dredging and waste disposal management, mineral resources estimates and defence considerations.

Geotechnical Subdivision

The Subdivision provides information on the characterization of geological and geotechnical properties and the determination of active geological and geomorphic processes that contribute to terrain hazards or other terrain attributes that influence man's use of the landmass.

9. ENERGY, MINES AND RESOURCES (cont'd)

A major part of the Subdivision's efforts is directed to projects in the Mackenzie Valley designed to provide information on material properties and terrain performance related to potential oil or gasoline routes and to construction of the Mackenzie highway. Laboratories in the National Capital Region are able to provide a wide spectrum of analytical services in support of these surveys.

Regional and Economic Geology (REG)

The Regional and Economic Geology Division surveys, describes and interprets the bedrock geology of Canada, excluding the Western Canada and Arctic Sedimentary Basins, but including the Pacific Continental Shelf. It also identifies the geological characteristics of occurences of mineral commodities and relates these to the geology of Canada for the purpose of estimating the mineral potential of the nation.

The Economic Geology Subdivision supports several objectives: to determine the character and distribution of mineral commodities and the ways they become concentrated during the evolution of their geological environments; to determine the local and regional geological features conducive to the occurence of specific types of mineral deposit; and to apply the information to provide qualitative and quantitative determinations of Canada's mineral resources. A large part of the operations is consequently the development of mathematical methods of reduction and analysis of geoscience data.

The activities of the Precambrian Subdivision include a program of reconnaissance mapping that encompasses all of the Shield, and an improvement of the mapping of areas most likely to provide data for elucidating the historical development of the Shield. These activities include studies in paleomagnetism (to study

9. ENERGY, MINES AND RESOURCES (cont'd)

the orientation and intensity of the magnetic field as it was years ago by examining ancient rocks), petrology (the origin, history, occurrence, structure, chemical composition and classification of rocks) and geochronology (age determination of rocks).

The survey nature of the studies means a good deal of field work and the National Capital Region laboratories as well as some other regional laboratories perform analyses and coordination for these studies.

Earth Sciences Program

The Earth Sciences program performs geophysical, seismic, gravity, geothermal geodynamic and geomagnetic studies of the earth's crust and interior. It provides data and information on seismic risk, the gravity field and gravitational anomalies, geothermal characteristics including temperature aspects of permafrost, the dynamical characteristics of the earth, the magnetic field and its variations, magnetic anomalies. Activities include the monitoring of earthquakes and nuclear explosions, earth tilts, strains, tides and polar motions, and the magnetic field.

The Earth Sciences program is divided into three divisions: Seismology, Gravity, and Geomagnetism. A summary of their activities follows:

Seismology Division

Seismology is the study of earth tremors, natural and man-made. By monitoring and analyzing the waves created by vibrations in the earth one can trace the physical properties of the earth's interior. The Canadian seismic network consists of thirty stations across the country and their continuous records allow seismologists to locate the regions of potential earthquake hazard. In addition to the permanent networks, temporary seismograph stations are established for special research purposes. Seismology also contributes to the detection and identification of underground nuclear explosions. In Ottawa, there is a digital and analog seismic analysis facility to handle the data. A geothermal studies section measures the distribution of heat flow throughout Canada as a key to physical properties of the Earth.

9. ENERGY, MINES AND RESOURCES (cont'd)

Gravity Division

The primary gravity network of Canada is a series of reference stations which provide absolute values of gravity for local surveys and a standard for calibrating gravity meters. Canada is part of the International Gravity Standardization Network of some 2,000 reference stations around the globe, and recently the complex calculations needed to determine the values of gravity at all stations in the network were carried out by the computing system in Ottawa.

Variations in the recorded values of gravity are partly due to variations in the underlying rock layer and the gravitational pattern, when compared with the geological pattern, provides important clues to the structure of the Earth's crust. This information is of special interest to the mineral industry - an aid to locating metal-bearing rocks, industrial minerals (such as limestone) and the fossil fuels; coal, petroleum and natural gas.

The laboratories in Ottawa deal with the results of these magnetic surveys and provide instrumentation and interpretation.

Geomagnetism Division

A network of permanent magnetic observations records continuously the direction and intensity of the geomagnetic field. Airborne surveys over Canada and adjacent ocean areas complement the station's data or extend it. A repeat station network measures the direction and intensity of the geomagnetic field once every five years at each of 100 points uniformly distributed over Canada in order to analyze and predict the magnetic secular change.

The Division also studies the geomagnetic field in the geological past as recorded by the natural magnetization of rocks, and to apply this information to the study of the formation of the crust and the origin of mineral deposits. Other studies focus on electromagnetism and plate tectonics.

9. ENERGY, MINES AND RESOURCES (cont'd)

On the outskirts of Ottawa, far removed from the magnetic disturbances caused by urban traffic, there is a unique geomagnetism laboratory - 17 small structures scattered over an enclosed site. Here the scientists design and test new magnetic survey equipment and analyze the samples sent back by the field parties.

10. ENVIRONMENT

Fisheries and Marine Program

Marine Sciences

The Marine Sciences Directorate is responsible for developing knowledge on the physical and chemical properties and dynamics of the marine environment adjacent to Canada and major water bodies within Canada; contributing to the effective use of these marine resources; and preserving and improving the usefulness and quality of Canada's marine waters. The Directorate's work is divided into two main specialities: hydrography and oceanography, both supported by a fleet of ships. Operations are conducted from regional establishments at Dartmouth, N.S., Victoria, B.C., and Burlington, Ontario and from headquarters in Ottawa.

Hydrography Branch

The headquarters planning group is studying the economic geography of four key areas of Canada with the aim of establishing national chart priorities in regards to future developments in shipping. Priorities have already been established for the Atlantic Coast and eastern Arctic and work has begun on preparing reports on potential deep water ports in these areas.

Oceanography Branch

The Canadian Oceanographic Data Centre continues to process and archive the serial station and bathythermograph data and maintain an international data

10. ENVIRONMENT (cont'd)

file. The Tides and Water Level Information Section analyses and predicts water levels and a satellite system is under development which will obtain hydrological and other data from all points in Canada.

Ship Branch

The Branch consists of the Engineering Division, which deals with matters such as vessel design, construction, repair, and replacement , while the Operations Division is concerned with statutory regulations requirements, manning, operational standards and statistics, vessel support arrangements with other agencies and submersible operations.

Environmental Services Program

Environmental Protection

The Environmental Protection Service has headquarters in Ottawa with approximately two-thirds of the total staff, and five service regions: Atlantic, Quebec, Ontario, Northwest and Pacific. These offices are the focal point for contacts with provinces and industry on environmental pollution matters. Programs and administration services throughout Canada are coordinated from Ottawa.

The Environmental Protection Service maintains bacteriological and chemical laboratories, and a motor vehicle testing laboratory in Ottawa. This laboratory is active in testing new motor vehicles for compliance with emission regulations, developing more accurate and less costly test procedures and evaluating promising concepts in vehicle emission control devices and systems.

The Air Pollution Control Directorate, of which the Emission Testing Laboratory is a part, is responsible for preserving, restoring or enhancing the quality of the ambient air in Canada for optimum social and economic benefits. The Water Pollution Control Directorate aims at the control and abatement of water pollution. Their activities include reduction of existing pollution, achievement of regional water quality objectives by means of appropriate programs and the development of new techniques in water pollution control.

Environmental Management

The Environmental Service groups the Canadian Forestry Service, the Inland Waters Directorate, the Canadian Wildlife Service and the Lands Directorate under a single authority.

10. ENVIRONMENT (cont'd)

Canadian Forestry Service

The Canadian Forestry Service in Ottawa consists of the departmental headquarters and Canadian Forestry Institutes.

The Forest Fire Research Institute provides research and advisory services on forest fire problems of national concern. Through its contacts with international fire research and forestry organizations, the Institute also provides liaison between the work of various international, national, regional and private forest protection agencies.

The Chemical Control Research Institute places emphasis on the broader aspects of pest damage control, with increased cognizance of the importance of environmental protection. Activities include a toxicological program which selects pesticides most suited to forest pest control, aerial spraying and residual pesticide studies.

The Eastern Forest Products Laboratory is divided into four sections which collectively attempt to provide the research and technology necessary for greater efficiency in the utilization of forest resources. Wood engineering research deals with timber engineering, engineering physics, mechanical processing and packaging while wood protection research includes entomology, pathology, preservation, fire research and protective coating. Wood anatomy, wood drying and log and lumber quality are the concerns of the wood production research group and finally research into wood products includes veneer and plywood, composite products, glues,and potential chemical uses for wood constituents.

Inland Waters Directorate

The Directorate is concerned with the management and use of inland water resources including the control of pollution and aims to maintain levels of quality and quantity appropriate to the intended use of water resources. It operates through three branches and five regional offices - Halifax, Montreal, Burlington, Regina and Vancouver - and has coordinating responsibilities for the Canada Centre for Inland Waters at Burlington.

10. ENVIRONMENT (cont'd)

The Water Resources Branch consists of the Water Survey of Canada and the Glaciology and Hydrology Research Divisions. The Water Survey of Canada maintains Canada's national network of streamflow, water level and sediment transport stations. Water samples are collected for quality analysis, snow and glacier surveys are carried out and flood forecasts are provided. The Glaciology and Hydrology Research Divisions are concerned with research into all aspects of surface and subsurface water.

The second branch, Water Quality, was recently reorganized so that all field survey and laboratory operational responsibilities were assigned to the regional offices. The Water Quality Monitoring and Surveys Division conducts national programs of about 1,000 reference points on major waters in Canada to obtain base-line water quality data. The data are stored and processed in a National Water Quality Data Bank (NAQUDAT). A remote sensing device for the detection of oil spills, based on laser techniques was successfully developed and field-tested, and several automated techniques for the analytical determination of pollutants in water have recently been developed.

The Water Planning and Management Branch concerns itself primarily with comprehensive water resource planning throughout Canada. Numerous programs are undertaken in cooperation with provincial and other federal agencies. Regional offices have been formally established to direct many activities previously handled from Ottawa.

Canadian Wildlife Service

The units of the Canadian Wildlife Service in the National Capital Region include the Eastern Regional Headquarters and the Laboraotry in Vanier consisting of a Pathology Unit, Bioelectronics Unit and a Toxic Chemicals Laboratory.

The Eastern Regional Headquarters conducts research on migratory birds, wildlife in the Northwest Territories and National Parks and provides advice on the potential impact of industrial development on wildlife. It serves the region of Ontario to Newfoundland and the eastern Arctic.

10. ENVIRONMENT (cont'd)

Research on the factors affecting the health of wildlife populations is conducted at the Pathology unit. This unit serves all regions for the CWS. The Bioelectronics unit aims to develop and supply tracking and monitoring equipment for various species of wildlife, and microclimatological data to research scientists. The Toxic Chemical Laboratory attempts to develop analyses for new environmental contiminants. It also analyses wildlife tissues for toxic chemical residues.

Lands Directorate

The Directorate conducts federal-provincial surveys of land use and capability for agriculture, forestry, recreation and wildlife. A new environmental effects study program has been established to produce base line data required for environmental assessment of major development proposals.

12. NATIONAL HEALTH AND WELFARE

Administration Program

One of the special concerns of the departmental administration is long-range health benefits. The Long Range Health Planning Branch is responsible for originating and developing ideas in this respect. Research contributions include: studies on the prevention of illness through changes in self-destructive life-styles; participation in an international project to evaluate the quality and cost of health services; an analysis of the distribution system for pharmaceuticals; and development of health status indicators for areas inaccessible to physicians.

Health Care Program

The Medical Care Directorate is responsible, among other things, for conducting studies and providing technical and professional consultive services to the provinces and other bodies.

The Health Facilities Design Directorate is concerned with the construction and operation of health facilities. It provides a national consulting service in architecture, engineering, and construction costs in health facilities and participates in the development of methodologies for information retrieval

12. NATIONAL HEALTH AND WELFARE (cont'd)

from existing health facilities for studies on the relationships of function to space, costs environment, and architectural, mechanical and electrical design.

Health Protection Program

Food Research Laboratories

The Laboratories conduct research in the areas of food chemistry, nutrition, microbiology and toxicology. They also supply information and services to other programs. Recent studies include investigation of various substances in cooked meats, mercury poisoning in fish, accumulation of several agents in body tissue, and causes of fat accumulation in heart tissue. Techniques have been developed for these and other tests and an extensive monograph was published outlining a number of chemical methodologies. The laboratories conduct continuing surveys, for instance, to establish the presence of certain chemicals in Canadian diets.

Drug Research Laboratories

The Laboratories consist of four divisions: Drug Toxicology, Pharmacology, Pharmaceutical Chemistry and Drug Statistical Services.

Some of the recent investigations of the Drug Toxicology Division were: the effects of acetylsalicylic acid on the metabolism; the effects of the simultaneous ingestion of alcohol on the metabolism of other drugs; the development of techniques for detecting allergies to penicillin and other drugs; and the establishment of a Registry for Adverse Reactions to Drugs.

The Pharmacology Division investigates the effects of drugs used in medical treatments. The toxicity of several drugs used in the treatment of mental disorders has been studied as well as liver dysfunction and other ailments induced through the use of contraceptives. The Division studies the uptake of drugs in the body and develops techniques necessary for these studies.

12. HEALTH AND WELFARE (cont'd)

The development of new or improved methods for the assay of drugs and the detection of impurities in drug products is the responsibility of the Paramaceutical Chemistry Division. It also performs drug analyses for the RCMP and other organizations and evaluates medical drugs as part of the Drug Quality Assessment Program (QUAD).

Environmental Health Directorate

The Directorate conducts research on the interactions between humans and their environment and the effects such interactions have on human health. It consists of the following divisions and bureaus.

The Human Development Division has as its role the detection and evaluation of environmental agents known to have or suspected of having an adverse effect upon normal growth and development. Studies have been conducted at The Cytogenetics Laboratory to evaluate the effect of ionizing radiation. Other research includes special studies on congenital reduction deformities of the limbs, and a study of birth defects.

The Bureau of Health Standards is responsible for evaluating potential health hazards derived from air or water. It prepares and publishes health criteria for pollutants, recommends environmental standards and provides technical assistance to other departments in the sampling and analysis of harmful materials.

The Air Pollution Hazards Division does research on the toxic effects of industrial vapors and provides consultation and technical assistance to government departments, universities and industry. It is concerned with methods of measuring contaminants as well as ways of reducing the hazard.

The Radiation Protection Bureau is primarily a testing and law enforcement agency. Activities include the analysis of new radiopharmaceuticals, the inspection of radioisotope and x-ray installations, the drafting of regulations and the investigation of incidences of excessive exposure to radiation. The Bureau conducts fallout analyses of milk, air and water to monitor possible contamination of areas adjacent to nuclear reactors.

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12. HEALTH AND WELFARE (cont'd)

The Water Pollution Hazards Division studies the health effects of such water pollutants as heavy metals, heavy metal chelating agents, nitrilotriacetic acid (NTA) and amines.

Epidemiology Services

The Epidemiology Service maintains surveillance of both infectious and noncommunicable diseases and provides a central service to all Health Branches of the Department which will include adequate research, medical, field study and statistical components.

Laboratory Centre for Disease Control

The Laboratory's role includes chronic, non-microbial as well as communicable diseases. The Centre has responsibility for licensing biological drugs and for controlling medical devices. The services of the Centre are available to provincial health departments, hospitals and other agencies. Activities include development of methodologies for assessing vaccines, typing of strains of diseases, and the provision of a wide variety of reference services.

14. INDUSTRY, TRADE AND COMMERCE

The manpower engaged in scientific activities is involved completely in the administration of extramural programs. There are several programs which operate in support of industrial research and development:

IRDIA - Industrial Research Development Incentives Act
PAIT - Program for the Advancement of Industrial Technology.
DIP - Defence Industry Productivity Program

15. INTERNATIONAL DEVELOPMENT RESEARCH CENTRE

Most of the manpower and expenditures of the IDRC are devoted towards the administration of extramural programs. The Centre places emphasis upon work that will primarily benefit people living in rural communities in low income countries and the research is conducted by scientists in these countries whenever possible. Some development work is contracted out to universities when necessary.

16. MEDICAL RESEARCH COUNCIL

The Medical Research Council performs no intramural research; its personnel is engaged in the direction and operation of its grants program, awards programs and other special programs.

17. NATIONAL DEFENCE

Defence Services Program

Quality Engineering Test Establishment (QETE)

QETE is organized to provide laboratory testing services, field and advisory services for material in such functional areas as quality assurance, design, development, production, operations, logistics, and maintenance. The establishment is divided into five sections.

Chemical Section: This section has laboratories specializing in the chemical analysis of all types of materials. Facilities are available for the evaluation of foods, pharmaceuticals, cleaning materials, etc. Other laboratory units are equipped for the physical and performance testing of fuels, lubricants, hydraulic fluids, organic protective coatings and related materials.

17. NATIONAL DEFENCE (cont'd)

Electrical and Electronics Section: The section consists of four laboratories, each one specializing in testing and evaluation. The Components laboratory concentrates on the testing of electronic and electrical components and materials. The Electronic and Power Systems laboratory performs testing on electronic sub-systems and power systems such as motors and electrical cables. The performance of environmental tests on electronic components and the modification, repair and calibration of test equipment, is the role of the Calibration and repair laboratory. Finally the Design and Development laboratory specializes in test set-ups for the laboratories within the section and the evaluation of test equipment.

Environmental and Applied Physics Section: This section comprises a group of laboratories containing a range of environmental testing equipment capable of subjecting end items to a wide variety of environmental and durability testing. There are also laboratories capable of measuring parameters in such physical science areas as light, sound and radiation.

Mechanical and Metallurgical Section: The mechanical laboratories can test such items as surface vehicle tires, aircraft hydraulic components and safety equipment forestry hose, and building materials. The metallurgical laboratory specializes in failure analysis of metallic structures.

Standards Section: This section consists of Mechanical and Electrical Standards Laboratories.

The Establishment is also responsible to the Director of Flight Safety to provide an "in-house" laboratory and technical investigation capability in the area of flight accident investigation.

Land Engineering Test Establishment (LETE)

The Establishment, at facilities just outside Ottawa, conducts tests on vehicles for the Department of National Defence. These may be prototype vehicles under development or other vehicles being considered for purchase by the department. LETE also does evaluations of various airfield support equipment such as snowplows and sweepers.

17. NATIONAL DEFENCE (cont'd)

LETE also operates an electronics laboratory on the grounds of the National Research Council for testing electronic equipment used in communications.

Defence Research Board

Defence Research Analysis Establishment (DRAE)

The Defence Research Analysis Establishment provides scientific evaluation and analysis of present and future weapons systems, tactical doctrine and other aspects of military operations including strategic problems. The establishment was created by the addition of a new General Analysis Division to the existing Operational Research Establishment and the establishment's activities were broadened to include not only conventional operational research on tactics and weapons systems but also the study of larger strategic economic, managerial and social issues.

The greatest contribution of the establishment is in its ability to conduct integrated studies which survey problems as a whole. A major example is its contributions to the decision to purchase a replacement for the Argus long-range patrol aircraft. Extensive studies were conducted in the areas of cost-benefit analysis, logistic obsolescence, performance levels, and criteria and contractor guidelines.

Other contributions of the establishment reflect new wide-ranging interests including an inexpensive and practical method of collecting oil slick samples from water surfaces; collaboration with Armed Forces specialists in studies aimed at increasing the success of search and rescue operations; and analyses of the effectiveness of various emergency locater transmitters. The Establishment is also active in developing mathematical techniques to aid management in such areas as recruitment forecasting, in-house communication and inventory control.

Defense Research Establishment, Ottawa

For many years, the Establishment has been responsible for research on power sources and, along with the Defense Research Establishment Suffield, on defence against nuclear, chemical and biological attack. More recently it has also become responsible for the Board's northern research activities and for

Federal Scientific Establishments in the NATIONAL CAPITAL REGION, 1973.

17. NATIONAL DEFENCE (cont'd)

supervising and supporting defence communications studies carried out chiefly by the Communications Research Centre of the Department of Communications.

A minimum program of research is maintained to provide the expertise necessary to advise and assist the Canadian Armed forces and other governmental agencies with nuclear defence problems. Studies are being made of the effects of radiation doses on vital organs, radiation transport through materials, and of drugs which might decrease human susceptibility to radiation. Dosimeters and other radiation measuring devices are being developed. The chemical defence program includes applied research on protective clothing and equipment and the development of devices which will detect chemical attacks.

A substantial proportion of the northern research program is related to operations of the Canadian Armed Forces in the north. Investigations are being made of both the intermediate and short-term effects of ice movement and drift on troop mobility and of the value of using remote sensing devices for surveillance purposes. Considerable work is done on testing and improving the equipment used by soldiers in northern field operations.

Power source research has concentrated on improving the performance and lowering the cost of batteries used to provide power for various military devices.

In the area of defence electronics, the establishment monitors all activities related to military communications and radar projects carried out by the Communications Research Centre, the Defence Industrial Research Program, and the University Grants Program. Intramural research has also been initiated on some aspects of electronic warfare with particular emphasis on signal interception and analysis.

19. NATIONAL MUSEUMS OF CANADA

Those museums engaged in natural scientific activities include the Museum of Natural Sciences, the National Museum of Science and Technology and the Canadian Conservation Institute.

Museum of Natural Sciences

The museum is responsible for the collection, classification, preservation and display of objects necessary to the study of the natural sciences. Field expeditions are organized with the purpose of enlarging the national collections in botany, zoology, mineralogy and paleontology. Extensive research is performed in traditional areas such as systematic biology, palaeontology and mineral sciences where little university work is done. Considerable numbers of scientific publications are prepared and the staff participates in national inventories and international programs such as the Flora of North America project, the International Biological Program, and an international program of implementing automatic data processing methods in natural science collections. The museum is also developing its role as a national identification centre through the creation of units such as the Canadian Oceanographic Indentification Centre and the Zooarchaeological Research Unit (identification of animal remains from archaeological excavations). Research is conducted under four divisions: botany, zoology, mineral sciences and palaeontology.

Botany: Botanists continue to collect specimens for inclusion in three life-size exhibits: the Coast Forest, the Arctic Tundra and the Great Lakes - St. Lawrence Forest Region. Twenty-six thousand new specimens were acquired in 1972-73.

Zoology: The staff completed a pilot project in Electronic Data Processing and participated in a National Science Foundation - supported survey of birds, mammals and marine life of the Antarctic Coastal regions. The division conducted 22 field projects across Canada and also in Hawaii and Antarctica and acquired some 5,500 lots of specimens. The Division operates the Canadian Oceanographic Identification Centre and the High Arctic Biological Station which conducts ethological research on Bathurst Island.

19. NATIONAL MUSEUMS OF CANADA (cont'd)

Palaeontology: Investigations continued on the problem of the extinction of the dinosaurs involving studies of the stability of dinosaur faunas, geomagnetic and geochemical data assessment. Research also continued on the Yukon ice age and on giant marine lizards (mosasaurs) in western and northern Canada

Mineral Sciences: The Division is now emphasizing the collection or purchase of specimens. Studies were made of the mineralogy of special areas of Quebec and Ontario.

National Museum of Science and Technology

The museum has the function of a cultural-educational institution designed to bring scientific literacy to the visiting public and to familiarize them with the language, events and history of science. Particular emphasis is on the technologies of ground transportation, aviation, agriculture, shipping and industrial technologies closely associated with the history of Canada. The museum sponsors lectures on the history of science and technology and conducts a program of school tours. Publications expand the content of exhibits and give popular accounts of Canadian scientific and technological achievements. A major effort is being made to record scientific events, processes and techniques of historical importance. The museum loans specific artifacts to other museums in Canada and provides technical advice. The museum staff develops new and unusual displays of scientific and technological subjects of interest to the public.

Canadian Conservation Institute

The Institute was established in 1972 to act as a national centre of expertise in the fields of restoration and preservation of cultural property. Plans are to establish regional conservation laboratories throughout Canada. At present most work is still organizational, however, considerable conservation work and research has begun and members are beginning to participate in professional conferences and international organizations. A development program trains technicians and professional conservators.

20. NATIONAL RESEARCH COUNCIL

The National Research Council laboratories are divided into seven divisions. Besides the laboratories, the National Science Library and the Technical Information Service are actively engaged in scientific activities.

Division of Biological Sciences

This Division was formed from the recent amalgamation of the Biochemistry Laboratory and the Division of Biology. This amalgamation allows for an interdisciplinary approach to significant problems in the areas of environmental, food, radiation and molecular biology. Seventeen groups are presently identifiable but as common interests develop or new expertise is required the composition of these groups changes:

Five groups, formerly of the Biochemistry division, conduct research on the structure-activity relationships in biological systems. This includes work in x-ray crystallography, molecular biophysics immunochemistry, nucleic acid-protein interactions and bio-organic synthesis.

The other twelve groups are from the Division of Biology. Three Environmental Biology groups are concerned with the environmental effects on organisms and their constituents. Two other groups work in the area of food biology and technology and another four groups in radiation biology. The Biomathematics groups construct computer simulations of biological systems. A Laboratory Animal Facility provides for the care of all animals used by NRC.

Division of Building Research

The Division plays a triple role as an information, advisory and research agency serving the construction industry of Canada. Information and advisory activities include technical support to the Central Mortgage and Housing Corporation, technical and secretariat assistance in the production of the National Building Code of Canada, service on over three hundred standards and technical committees, the answering of approximately five thousand enquiries from industry, and the publication of the Canadian Building Digest and other publications.

20. NATIONAL RESEARCH COUNCIL (Cont'd)

There are six research sections within the Division, concerned with providing basic information on building materials, interior environment, structural design, fire prevention and sub-surface factors. As only limited coverage of industry's research needs is possible at any given time, the Division maintains the closest possible links with other agencies whose work has some relevance to building construction. The six sections are:

Building Materials	- evaluation of the performance of materials.
Building Physics	- response of buildings to dynamic forces, problems of vibration, acoustics, sound absorption.
Building Services	- environmental studies including air moisture and heat transfer characteristics.
Building Structures	- factors affecting safety of structures.
Fire Research	- fire resistance of assemblies of materials, surface flammability.
Geotechnology	- studies of soils, permafrost, peat, ice and snow, both in their natural state and as they relate to building structures.

Division of Chemistry

The work of the Division of Chemistry covers a broad spectrum ranging from short term programs, aimed at practical application to the natural resource and chemical industries, to long-term fundamental investigations in selected areas of scientific and technological importance. The Division continues to contribute strongly to the published literature in scientific and technical journals, participates in Canadian and international scientific committees and organizations and provides advice and assistance on technical matters on request.

The Division is active in many fields, some concerned with possible industrial applications and others dealing with fundamental investigations of the properties of materials or processes affecting them. The fields include: analytical chemistry, chemical engineering, spectroscopy,

colloids, polymers, high pressure, hydrocarbons, kinetics, photochemistry, catalysis, metallic corrosion and oxidation, metallurgical chemistry, molecular structures, organic spectrochemistry, organic synthesis, textile chemistry, theoretical studies and thermochemistry.

Division of Mechanical Engineering

At present the Division's activities lie in six general areas with the division effort indicated as follows:

Transportation Engineering	(45%)
Manufacturing Technology	(30%)
Standards and Standardization	(10%)
Computers in Engineering Design	(6%)
Engineering and Biological Control Systems	(5%)
Medical and Surgical Instrumentation	(4%)

There has been a reduction in manufacturing technological support to industry since other areas required more of the Division's efforts. To compensate, firms are invited to send employees or operatives for short periods of training on advanced machine tools of types contemplated for purchase by the firms.

Transportation research in the Division covers land, air and water modes. The land work pertains primarily to air cushion assisted vehicles, miscellaneous problems of diesel locomotives and in stationary applications to climatic effects on remotely operated railway switches, installation of rails, gas turbines and for gas pipe line service. Water transportation investigations fall into two areas. The first is the design, powering, manoeuverability and rough water behaviour of fishing vessels and ships. The second deals with a hydraulic model of an important section of the St. Lawrence River and the numerical simulation of the St. Lawrence and Fraser Rivers and the Strait of Georgia. There is also considerable investigation of other important water bodies in Canada. Air transportation research includes the monitoring of aircraft noise, the development of various flight instruments and the examination of engine strategies for STOL and VTOL aircraft.

20. NATIONAL RESEARCH COUNCIL (cont'd)

Manufacturing technology research consists of a miscellaneous assortment of projects of interest to the industrial instrumentation community. Recently research has been conducted in the areas of textile manufacturing, electrochemical machining, electrodischarge machining, numerical control of drilling, tapping and milling machines and precision gear grinding. This information is published as news letters at intervals, but is continuously available to industry upon inquiry.

The standards work is basically concerned with the behaviour of various industrial products such as diesel oil, lubricating oils and additives and greases, and the corresponding pollution results.

Computer applications of digital and hybrid computation techniques present an economical solution to a variety of design and operating problems of a wide range of machinery. Work on engineering and biological control systems continues in the industrial application of control theory - mechanical, electronic, and fluidic - and in the application of a variety of the techniques to measurements of the performance of human operators. The requirements of exhaustive experimentation for trials of medical and surgical instruments has forced consolidation of projects already well advanced.

National Aeronautics Establishment (NAE)

The NAE conducts aeronautical research to meet the needs of military and civil aviation with studies of problems in aerodynamics, aircraft structures and materials, and flight mechanics. The Establishment has acquired major items of experimental equipment such as wind tunnels, structural test rigs, experimental aircraft and standards. The recent difficulties of the aircraft industry and its corresponding contraction have permitted some measure of reorientation in the work program of the NAE. As a result of its competence and equipment in fluid dynamics, structural theory and analysis, materials technology and dynamics, the NAE has been able to undertake programs of research in road and motor vehicle safety, in material technology in various applications of non-aeronautical aerodynamics and in certain ecological problems.

20. NATIONAL RESEARCH COUNCIL (cont'd)

The Establishment maintains sections in both high- and low-speed aeronautics to conduct basic research, as well as investigations of jet noise and other applied problems. The sections support Canadian industry by supplying up-to-date wind tunnel facilities and consulting services. Another section studies unsteady flow phenomena and problems related to the dynamic stability of aircraft. The Flight Research section provides the means for investigating, in flight, new avenues for aircraft development, problems arising in operations and new applications for aircraft.

The Structures and Materials Laboratory includes sections on Materials Sciences, Aircraft Environment and Airworthiness, Mechanics, and Motor Vehicle Safety.

Division of Physics

The principal activities of the Division of Physics can be grouped into three related areas:

a) the maintenance of basic physical standards and the calibration of measuring instruments for industries, governments, and universities;
b) general research programs in selected areas of physics;
c) the provision of advice and information to industries and governments and designs for industrial products.

There are several aspects to the Division's work on standards. Apparatus to reproduce the basic standards is constructed according to international specifications and measurements made with the appartus are compared with those from other industrialized nations. The apparatus is also used for calibrating measuring instruments for Canadian industries and government. Considerable effort is also devoted to improving standards through the development of new instruments and techniques to realize accepted standards as well as the investigation of phenomena which could lead to totally new and improved standards.

General research programs are carried out in a number of areas, the largest programs being in space physics, metal physics, plasma physics, photogrammetry

20. NATIONAL RESEARCH COUNCIL (cont'd)

and spectroscopy. In these programs, the Division endeavours to develop a research capability which will make substantial advances in the understanding of basic principles, and at the same time use the expertise for a variety of other industrial and social purposes.

Many staff members of the Division serve on industrial and government committees dealing with standards and safety and every year the Division operates a school which deals with methods of measurement in one or two selected areas of physics at the level required by industry. Considerable effort is devoted to improving standards through the development of instruments which are suitable for industrial production, and patents on many instruments have generated considerable income over the past few years.

The various sections of the Division are listed below:

Acoustics,
Cosmic Rays and High Energy Particle Physics
Electricity
Heat and Solid State Physics
High-Temperature Physics
Instrumental Optics
Laser and Plasma Physics
Mechanics
Metal Physics
Optical Physics
Photogrammetry
Radiation Optics
Spectroscopy
Time and Frequency
X-rays and Nuclear Radiation.

Radio and Electrical Engineering Division

The Radio and Electrical Engineering Division comprises a) the Astrophysics Branch which consists of four sections conducting basic

research programs in radio and optical astronomy and phenomena of the upper atmosphere, as well as Canada's national radio observatory, the Algonquin Radio Observatory;

b) six research sections whose programs include fundamental mathematical research and a wide range of practical applications of electronics and electrical engineering; and

c) the Engineering Design Section and Model Shop where much of the mechanical design and construction of research apparatus is carried out.

The Astrophysics Branch activities outside the National Capital Region are described in the Sections on British Columbia (Dominion Astrophysical Observatory and the Dominion Radio Astrophysical Laboratory) and Ontario (Algonquin Radio Observatory). The recently completed Ottawa River Solar Observatory conducts optical solar research. The telescope is designed to provide large-scale, time-lapse photographs of structure in the solar atmosphere. This program is directed towards an improved understanding of the causes of solar activity and associated explosive events. The observational program is complemented by theoretical studies of chromospheric phenomena.

An Instrument Group in Ottawa is responsible for the development of new receivers for the Algonquin Radio Observatory and for the design and implementation of a computer-operated data acquisition and telescope control system.

The Upper Atmosphere Research Section conducts most of its activities away from the National Capital Region with the exception of a radar installation for phenomena associated with aurorae and the Springhill Meteor Observatory for observations of meteors and fireballs.

The six research sections of the Radio and Electrical Engineering Division are briefly described below:

Data Systems - development of data systems for researchers and man-computer communications

Information Science - application of computer technology in the service of industry and society.

20. NATIONAL RESEARCH COUNCIL (cont'd)

Electrical Engineering	- high voltage studies, precision measurement techniques, and theoretical and experimental work in solid state physics.
Electromagnetic Engineering	- development of antennas and transmission components for specific applications.
Electron Physics	- fundamental experimental research in solid surface effects and quantum electronics.
Instrument Design	- maintains national reference standards for certain radio frequency quantities, conducts basic studies in bioengineering and develops electronic aids for the handicapped, especially the blind.

Technical Information Service

The Technical Information Service consists of a central group in Ottawa which provides technical support for eleven field offices. Six of these are operated by agreement with provincial research councils. TIS provides assistance upon request to small and medium-scale manufacturers. Annually more than 10,000 enquiries are directed through the offices where field engineers either solve the problem from their own knowledge or refer it to the central office in Ottawa. They may suggest sources of material or equipment, help a company recruit its technical personnel, or locate appropriate training courses. In many cases they help establish contacts with other government and private enterprises for financial support, research grants, testing facilities and similar types of services.

The Ottawa staff of TIS draws on several major sources of information. The most immediate is their personal knowledge and experience, and material which they have collected in their own field of interest. Another important source for TIS is the National Science Library which comprises more than 800,000 volumes including journals, serial publications, books, pamphlets, and technical and scientific documentation from foreign sources. Still another source of information is the very large group of NRC scientists and engineers as well as those in other government departments, research centres and in universities and industry.

21. POST OFFICE

The Equipment Programs Division of the Facilities, Planning and Equipment Branch is responsible for the equipment programs of the Canadian Post Office. Equipment is purchased, modified if necessary, installed and then rigorously tested against performance standards set by the Division.

Work on equipment development is presently limited because the engineering staff is involved in the acceptance testing of equipment purchased for the Coding and Mechanization program.

22. PUBLIC WORKS

The Testing Laboratories of the Department of Public Works are designed to serve as the central testing facilities of the Federal Government. They include laboratory and field testing facilities and specialized consulting services in many diversified technical fields ready to provide service to all Federal Departments and Agencies. These testing services include:

- testing to standard specifications to ensure technical suitability and general quality of materials for use in the construction and maintenance of public buildings.
- special investigations in cases where engineering problems are encountered or where no suitable standard exists, such as with new materials or combination of materials.
- assistance in the preparation of requirements and standards test methods.
- undertaking pre-engineering, sub-surface investigations for projects such as building foundations, marine structures, bridges and service lines.
- acting as consultants on matters relating to the physical and chemical properties of materials, soils mechanics, specifications and standards.

Support for departmental projects accounted for 65 percent of the Laboratories services and resources and other federal departments and agencies accounted for 35 percent. The laboratories consist of the following sections: chemical, physical and soil mechanics.

In addition to the testing laboratories, which have been renamed Research and Development Laboratories, the Department has extensive design and construction groups.

Federal Scientific Establishments in the NATIONAL CAPITAL REGION, 1973

25. TRANSPORT

Long term research into advanced transportation technologies is usually assigned to the Transportation Development Agency while the various transportation administrations (air, marine, surface, arctic) are more involved in operational research and development.

Headquarters

The Policy Planning and Major Projects group is involved in the secondary analysis of studies prepared by the various transportation administrations. Emphasis is on reviewing and implementing studies of the most pressing transport problems. Recent work has centered on the organization of a demonstration service for STOL in preparation for the development of a major national program.

The Canadian Air Transport Administration

The Canadian Air Transport Administration controls and operates Canada's airways and federal airports and provides technical supervision of all aeronautical actitivies in the flight safety sense. Scientific activities, chiefly developmental, are in matters relating to air traffic measurement and control, air and marine navigation, and airport planning and operation.

Telecommunications and Electronics Research Division is responsible for about two-thirds of the Air Transport Administration's scientific activity Emphasis is on applied developmental research in three areas: computer systems, navigation radar and video, and satellite communications. The computer systems group is presently involved in a number of major projects such as the Gandes automated air traffic system (GAATS), and an air traffic control simulation centre for the training of air traffic controllers. The group provides engineering and scientific consulting services for the Ministry as well as other departments and operates a laboratory at Uplands airport. The navigation radar and video display group is included in the development of air and marine navigational procedures and equipment. Of particular concern is a method of digitizing primary radar video data to enable transmission of information through land lines.

25. TRANSPORT (cont'd)

Communications group is involved in the North Atlantic Communications and Surveillance Satellite project in cooperation with NASA and the Department of Communications. The group is also involved in a preliminary cost-benefit analysis of a proposed maritimes satellite.

Air Traffic Services Simulation Centre research overlaps that of the Telecommunications and Electronics Air Branch. Both are concerned with the construction of the simulated air traffic control environment and the development and evaluation of automated and improved radar display systems. Present research focuses on the technique of computer simulation in regards to the modification or rearrangement of airport navigational aids, placement of new airports or runways and the development of control standards, and runway structures.

Aviation Planning and Research Division conducts studies in three areas: mathematical modelling, economic analysis and technological review - environmental impact studies. Recent projects include the development of a daily profile for air traffic, and noise exposure forecasts for all Canadian airports, cost-benefit analyses of emergency services, and the evaluation of noise monitoring systems.

Architectural R&D Division is presently being reorganized into branches which correspond to the two aspects of the Division's work: the analysis of specific problems concerning the planning and operation of airports and the nature of air traffic; and internal research devoted to the definition of functions of both airports and airport systems. The Division has been involved in the creation of master specifications in regards to construction and cooperates in this matter with numerous agencies and industry.

Canadian Marine Transportation Administration

The Marine Aids and Waterways Development Branch carries out engineering studies, applied research, standards, and planning and programming related to marine transportation facilities in waterways where the Ministry has responsibility. A marine aids group is included in the development of equipment for an integrated marine traffic information control system and in developing off-shore mooring systems for large ships. A waterways development group conducts numerous hydraulic model and economic studies aimed at harbour improvements and the extension of the shipping season.

Federal Scientific Establishments in QUEBEC, 1973
(excluding Hull)

1. AGRICULTURE

Research Branch

Experimental Farm, L'Assomption

The experimental farm at L'Assomption conducts research on cigar and cigarette tobacco and its classification. Activities undertaken for the improvement of tobacco might include: selection of hybrid lines and their resistance to disease, a preliminary and advanced evaluation, trials on different dates of planting, sampling of planted crops and studies on various modes of drying.

Personnel at the Farm collaborate with other agricultural experts in Quebec who are involved in improving tobacco growing.

Research Station, Lennoxville

The research program is centred on animal production, especially cattle. The main program includes the breeding, physiology and management of dairy cattle, sheep and swine, with crop management, soil fertility and plant studies conducted in support of the animal program.

Research Station, Sainte-Foy

The Research Station at Sainte-Foy groups the activities of the main station and those of the experimental farms at Normandin and La Pocatière. It is the main centre for field crops and soils research in Quebec. The research program includes genetics and plant breeding of cereals and forages, plant protection, plant physiology, soil genesis and classification and soil fertility and management.

At the experimental farms a coordinated program involving research on soils, crops and animals is directed towards solving agricultural problems in the Lake St. John, Lower St. Lawrence, and Gaspé Regions. Herds in the National Dairy Cattle Breeding Project are located at these two farms.

1. AGRICULTURE (cont'd)

Health of Animals Branch

Animal Pathology Division Laboratory, St. Anne de Bellevue

The Animal Pathology division consists of the Animal Diseases Research Institute at Hull, Quebec and the Animal Diseases Research Institute (Western) at Lethbridge Alberta, and seven other laboratories including the one at St. Anne de Bellevue. These laboratories conduct research and investigations on diseases of animals and produce the biological products required in the control programs of the Branch. The Division also provides diasgnostic services for diseases of domestic and wild animals and provides a consultation service regarding veterinary biologics and other agents used in the control of animal diseases.

3. CANADIAN ARSENALS LIMITED

Filling Division, St. Paul l'Ermite

This plant is a facility for the loading of high explosives and propellants into large calibre ammunition. The operation includes the manufacture of initiating compositions, primers, detonators and delays, and the assembly of mechanical proximity and various other types of fuzes.

The filling and assembly of 105 mm ammunition, which included the manufacture of high explosive rounds, fuzes, supplementary and blank charges, represent the major portion of the workload.

4. CANADIAN BROADCASTING CORPORATION

Technical Development Department, Montreal

The activities of the department are related to solving the operational problems of broadcasting and on occasion other government departments, like NRC, are consulted. The evaluation of new equipment for purchase by the CBC is performed here.

Federal Scientific Establishments in QUEBEC, 1973 (excluding Hull)

9. ENERGY, MINES AND RESOURCES

Mineral and Energy Resources Program

Research Laboratory, Mining Research Centre, Quebec City

This laboratory, one of five research laboratories of the Mining Research Centre, constitutes the Rock Breakage Group. Rock Breakage and Explosives Research is a program aimed at the study of the principles of rock breakage with a view to developing radically new mining methods. This study was initiated at the request of the Mining Association of Canada whose members have expressed the opinion that rock breakage is the most important area of mining research.

10. ENVIRONMENT

Fisheries and Marine Program

Arctic Biological Station, Ste. Anne de Bellevue

The Arctic Biological Station carries out the following major programs of research: studies of life histories and population dynamics of the more important species of whales and seals occuring on the east and west coasts of Canada and in the Arctic to provide information for management of these resources; studies of life histories, population dynamics and factors limiting production of marine and anadromous fishes of arctic Canada; studies of the benthos, plankton, and microbial flora of the arctic marine ecosystem to determine their inter-relationships and the factors that control production.

Environmental Services Program

(Atmospheric Environment)
Regional Office, Dorval

This is one of the six regional offices of the Service - Vancouver, Edmonton, Winnipeg, Toronto, Montreal and Moncton. For the Quebec region there are over thirty meteorological stations and many recording stations for rainfall, temperature measurement, etc. There is a good deal of cooperation with McGill University on the training of students, the use of equipment and assistance on thesis research.

10. ENVIRONMENT (cont'd)

(Environmental Management)

Canadian Wildlife Service, Cap Tourmente

A large bird sanctuary and game reserve, Cap Tourmente carries out research on population dynamics and growth rates of Canada Goose and other species.

Eastern Regional Office, Ste. Foy

The program here includes studies on feeding habits, environment, migration, and habitat improvement. Duck banding stations supply data on mortality rates, migration and returns to habitat. Laval University offers material and human resources, and CWS facilities are available to students.

Laurentian Forest Research Centre, Ste. Foy

Research projects are undertaken in entomology, forest economics, silviculture pathology, forest genetics, ecology and soils. There is a substantial degree of cooperation with the provincial government and Laval University, namely assistance in thesis supervision for the latter.

17. NATIONAL DEFENCE

Defence Services Program

Canadian Forces Technical Services Agency, Montreal

The network of Canadian Forces Technical Service Agencies across Canada is responsible for various technical support services including quality repair of equipment and the inspection of certain materials purchased by the department to ensure their high standards.

Proof and Experimental Test Establishment (PETE), Nicolet

The establishment is concerned with the testing and evaluation of armament and ammunition stores, as well as the quality assurance of DND contracts. It works in close association with the Defence Research Establishment, Valcartier.

17. NATIONAL DEFENCE (cont'd)

Defense Research Board

Defence Research Establishment Valcartier (DREV) Valcartier

The program at the establishment includes scientific research and long-range problems, and preliminary development of new and improved equipment, techniques and systems for the Department, and to a limited extent, for other government departments. The current program stresses work on surveillance and armament problems as well as research on lasers.

Efforts to provide the Canadian Armed Forces with improved capability in surveillance, reconnaissance and target recognition systems have continued, with particular emphasis on air-to-ground infrared sensors for the northern environment.

The Department of National Defence is investigating the potential for military use of gelled slurry explosives, an explosive which since the early 1960's has captured one-third of the North American market because it is cheap, extremely safe, pourable, water resistant, and has a high blast efficiency. It also appears that these explosives will be useful in civil engineering operations. Much of the work at DREV has been to extend the cold weather capabilities of these explosives.

DREV has been very active in the field technology on gas lasers with a substantial emphasis on the TEA (transversely excited atmospheric pressure) method of excitation. The laser program is of use to DND in the study of material damage and of new concepts of guidance and control. One advance in training procedures resulting from laser technology is a laser fire simulator for simulated weapon aiming and firing.

Another area of interest for DREV has been long-range patrol aircraft studies.

18. NATIONAL FILM BOARD

Technical Research Division, Montreal

The Division conducts applied research related to film production technology. Computer applications are involved to a large extent in the several projects that are underway. Activities include testing, feasibility studies and technical publications.

20. NATIONAL RESEARCH COUNCIL

Great Whale Geophysical Station, Great Whale River

This Station of the Space Facilities Research Branch measures and records various physical quantities for Canadian and American scientists on a continuous basis. For the Radio and Electrical Engineering Division the Station records different aspects of auroral phenomena. Measurements are also made of ionospheric absorption of cosmic radio waves. Great Whale is also one of the important ground stations in an international experiment in which ionized barium is released from a rocket high over the equator and its effect is measured as the disturbance travels down the magnetic field line to the earth.

Field Office, Technical Information Service, Montreal and Quebec

The Technical Information Service (TIS) of NRC is concerned with providing medium and small-scale manufacturers with technological information sources and thus help such companies identify and solve their problems. The central group in Ottawa provides technical support for 11 field offices which are strategically located near industrial concentrations. TIS answers generally summarize the state of the art as it relates to the problem, refer to selections of pertinent information, and where possible, propose a solution.

22. PUBLIC WORKS

St. Lawrence River Shore Study, Montreal

This study over several years investigated the nature and origin of erosion of the St. Lawrence River shoreline. In conjunction with the Department of the Environment, the Marine Engineering group measured the effects of waves, their frequency, height, etc. and the effect of passing ships.

24. ST. LAWRENCE SEAWAY AUTHORITY

Engineering Branch, Montreal and Eastern Region, St. Lambert

A large proportion of the expenditures is devoted to engineering studies on the possibility of extending the navigation season. The engineering branch was involved in geotechnical studies of groundwater and conducts soil stability tests, hydraulics testing and current measurements in canals.

25. TRANSPORT

Marine Transportation Program

Waterways Development Field Investigation Unit, Montreal

The unit collects hydraulic data in the St. Lawrence region in support of projects aimed at improving the navigational efficiency of Canadian waterways. At present, five ships are involved in data collection, with one of them being radar equipped and suitable for ocean travel.

Transport Development Agency

Headquarters, Montreal

The agency undertakes research projects to assess the transport possibilities of new developments in science and technology. Recent projects have included

25. TRANSPORT (cont'd)

the technology of air cushion vehicles including an investigation of their use for ice-breaking and research into ice formulation and its thickness, salinity, dynamics and mechanics with an interest in extending the shipping season in areas such as the high Arctic.

26. VETERANS AFFAIRS

Queen Mary Veterans Hospital, Montreal and Saint Anne's Hospital, Saint Anne de Bellevue

Both hospitals conduct research specifically related to geriatrics, and both concentrate on pschiatry. At Queen Mary Veteran's Hospital, recent projects have included a coordinated study of chronic bronchitis, metabolism of bilirubin in health and disease, protein binding hormones, antitrypsin and emphysema, toxicity, and metabolism of analgesics, and an integrated psychiatric research program. At Ste. Anne's Hospital, projects for 1972-73 include social sources and patterns of change, patient self-government, stress of relocation and Parkinsons disease.

Federal Scientific Establishments in NEW BRUNSWICK, 1973

1. AGRICULTURE

Research Branch

Research Station, Fredericton

The research Station at Fredericton is the main centre in Canada for research on the potato crop. Emphasis is placed on breeding and genetics, pest and disease management, harvesting and storage engineering, and soil and crop management. The Station is also the Atlantic centre for harvesting and storage engineering and for utilization and nutritional studies related to the production of cereal and forage crops for livestock feeding. The Station collaborates with other Branch establishments to evaluate the potential of new crops cultivars and selected management practices in New Brunswick.

In collaboration with other agencies, a study relating to environmental quality was started. Research emphasizes the impact on water quality of plant nutrients and pesticides applied to the potato crop. Scientific specialists have been recruited for soil erosion and hydrological studies and work on potato genetics.

10. ENVIRONMENT

Fisheries and Marine Program

Biological Station, St. Andrews

Research at St. Andrews is divided into two broad categories:

- research aimed at improving management and harvesting of commercial and recreational fisheries through studies of life history, population dynamics, stock assessment and behaviour in relation to fishing gear.
- environmental studies based on ecology, toxicology, physiology and behaviour.

Reflecting these two categories, the staff is organized into two teams: Renewable Resource Study and Environmental Studies. The Renewable Resource Group works on fishing gear research and associated fish.

behaviour, and research towards management of many groundfish, pelagic fish and invertebrate resources.

Sections in the Environmental Studies Group include: Applied Ecology, Toxicology, and Salmonic Biology with the long-range goal of studying the interrelation between land use (primarily the forest industry, its spraying practices and waste disposal) and fisheries (such as those for salmon, trout, and lobster).

Environmental Services Program

(Atmospheric Environment)

Regional Office, Moncton

This is one of the six regional offices of the Service - Vancouver, Edmonton, Winnipeg, Toronto, Montreal and Moncton. It coordinates the meteorological data gathered at various stations throughout the region to provide weather services to the general public and additional specialized services to groups and agencies concerned with aviation, water resources, forestry and agriculture.

(Environmental Management)

Maritime Forest Research Centre, Fredericton

In an area where forestry plays a significant role in the economy, the research is directed towards improved forest management and the welfare of the forest industries. Areas of research include silviculture, tree biology, entomology, forest pathology, forest fire control, and forest management and liaison. An insect and disease survey is carried out as a part of the national survey. Close liaison is maintained with provincial authorities and with industry.

East Water Quality Station, Moncton

Water analyses are undertaken in support of federal and provincial water management programs. Standard testing, even in low concentrations, includes automated analysis of organic and inorganic substances in water.

10. ENVIRONMENT (cont'd)

and survey programs are based in Moncton, including studies on the St. John River, and rivers in the northeastern New Brunswick mining area. The data areentered into the computerized storage, retrieval and reporting system in Ottawa, from which the reports are prepared.

Canadian Wildlife Service, Fredericton and Sackville

The activities of the Canadian Wildlife Service in the Maritimes are described under the regional office in Halifax, Nova Scotia.

Federal Scientific Establishments in NEWFOUNDLAND, 1973.

1. AGRICULTURE

Research Branch

Research Station, St. John's West

This station emphasizes continuing work on regional agricultural problems including reclamation and use of peat soils, crop production practices, fertility requirements for mineral soils and potato breeding. Included in the research programs are studies on insect control, plant diseases and plant nutrition and storage.

The station produces forage, cereals and roots to support a breeding herd of cattle. Plant pathology and entomology laboratories and a National Soil Survey unit are also located at the station.

10. ENVIRONMENT

Fisheries and Marine Program

Biological Station, St. John's

The main research efforts are concerned with:

- stock inventory and population dynamics of cod, American plaice, and yellowtail flounder
- separation of stocks of herrings by means of tagging experiments, parasite infestation, meristic studies, and other biological characteristics
- stock density of snow crabs in Newfoundland east coast bays, and effects of gillnetting for groundfish on the stocks; population dynamics of shrimp stock; stock relations of squid
- environmental studies on the effects of toxic metals and metalloids in the sea, and the monitoring of hydrography in the Newfoundland area
- technological studies on the quality of groundfish, problems of processing and exploratory work on carbohydrates in the marine environment.

The station is also participating in international experiments to strengthen former observations on the various national salmon stocks of high seas and West Greenland fisheries.

Federal Scientific Establishments in NEWFOUNDLAND, 1973

10. ENVIRONMENT (cont'd)

Environmental Services Program

(Environmental Protection)

District Office and Laboratory, St. John's

This is one of the district offices in the Atlantic region; it conducts air and water quality surveys and cooperates with the provincial government and the university in handling local problems.

(Environmental Management)

Newfoundland Forest Research Centre, St. John's

Work is primarily devoted to forest resources research. The investigations include silviculture, tree biology, pathology, entomology, soil, land classification, the ecology of bird habitats, forest fire research, economics (as related to stand thinning), forest management, and logging techniques. An insect and disease survey of the Newfoundland area is carried out, and public information services are provided.

Canadian Wildlife Service, St. John's

The Saint John's office participates in most of the Eastern wildlife service programs on migratory birds, mammalogy, land management, limnology, pathology, etc. Specific activities directly related to Newfoundland wildlife have included studies on the extent and location of waterfowl production in Newfoundland, an investigation on the importance of waterfowl as game in comparison with non-migratory species, and studies concerned with which species (Canada geese and sea ducks) can support greater exploitation and how.

Federal Scientific Establishments in PRINCE EDWARD ISLAND, 1973

1. AGRICULTURE

Research Branch

Research Station, Charlottetown

The station has regional responsibility for research into the production of forages, cereals, tobacco and vegetable crops grown for processing. Research is also conducted on local problems with potatoes, cattle nutrition and breeding and small fruits. The station's herbarium contains hundreds of plants, ferns andmosses indigenous to the island. Also located here are the Production and Marketing Branch's Advanced Registry Pig Testing Station and Seed Potato Inspection Section.

Federal Scientific Establishments in NOVA SCOTIA, 1973

1. AGRICULTURE

Research Branch

Research Station, Kentville

The Research Station at Kentville in the Annapolis Valley is the horticultural research centre for the Atlantic region. It deals with management, physiology, nutrition and breeding of fruit trees, small fruits and vegetables and is the centre for food processing research. The station is responsible for research on pesticide residues, and for poultry breeding and management. Considerable work has been done on the protection of crops against pests, both in the field and in storage.

The experimental farm at Nappan conducts research on the adaptation and management of fields crops, management of dikeland and upland soils, weed control, and cattle nutrition.

9. ENERGY, MINES & RESOURCES

Mineral and Energy Resources Program

Atlantic Geoscience Centre, Bedford, Dartmouth

The Atlantic Geoscience Centre is responsible for geology and geophysics of the Atlantic continental shelf and adjacent ocean floors as determined from shipborne surveys, and for the geology and appraisal of fuel potential of sedimentary basins of the St. Lawrence and Hudson Bay lowlands and the Atlantic continental shelf. It also has the departmental responsibility for advising on technological development, and on exploration for, and exploitation of, energy and mineral resources of the sea bottom. The centre is housed at the Bedford Institute of Oceanography where it has its own laboratory facilities, as well as those available on oceanographic ships of the Canadian government. It is staffed by specialists in marine geology and geophysics with a strong contingent specialized in the geology of fuels and sedimentary rocks.

10. ENVIRONMENT

Fisheries and Marine Program

Marine Ecology Laboratory, Dartmouth

The laboratory studies the processes underlying marine production, with special reference to fisheries. Attention is focused on four principal objectives:

- prediction of potential fish production and catch in various water masses;
- development of knowledge necessary to management for increased catch or increased efficiency of natural harvesting;
- assessing level of pollutants and their effects on natural production;
- development of methods and technologies for beneficial manipulation of environments applicable to marine culture or environmental quality control.

The laboratory, established at the Bedford Institute of Oceanography in 1965, initially was to investigate the dependence of fishery resources and their food-chains on changes in the physical environment. As a result there has been interaction of biological with physical and chemical studies, both within the Institute and with other laboratories in the area.

Atlantic Oceanographic Laboratory, Dartmouth

The laboratory, located at the Bedford Institute of Oceanography, is responsible for the research and survey activities of the Water Management Service on the Atlantic Coast and the eastern Arctic.

Hydrographers at the laboratory continue navigational charting on the Grand Banks, Labrador and the east coast of Newfoundland. Recently, revisory and special surveys in the Maritime provinces, the Gulf of St. Lawrence and in southern Newfoundland were conducted to meet increased marine development and new transportation patterns.

Oceanographic programs are carried out in a variety of locations ranging from local inlets in Nova Scotia through the Gulf and out on the high seas of the Atlantic. The Chemical Oceanography Division conducts studies of trace metal abundances, organic chemical species and conventional chemicals in the Gulf. The Coastal Oceanography Division conducts physical oceanographic studies

10. ENVIRONMENT (cont'd)

on the effects of hydro-electric developments and the subsequent decrease of spring runoffs into the Gulf. The Metrology Division is developing better survey methods using underwater sound, and a towed instrument package.

Halifax Laboratory, Halifax

The operations of the laboratory are organized into four main areas of responsibility; aquaculture fish contamination, marine lipids and products and preservation. This organization allows a diversified research program with particular reference to the utilization and improvement of fishery resources.

Information regarding the nutrition, biochemistry and disease of fish and shellfish is a prerequisite to aquaculture development in Canada. Current investigations include diseases in oysters, lobsters and salmonids, and the nutritional requirements of lobsters and oysters.

The fish contamination study program covers the uptake, accumulation and excretion of contaminants by fish and shellfish to determine the detrimental effects on the animals and their use as food.

Marine oils are evaluated for their commercial potential in human nutrition and in industry. Research is being conducted into the potential use of oils from herring, sand lance and cappelin in margarine and shortening.

The products and preservation program provide technological and scientific information on which to base orderly development and improvement of the Canadian fish trade. Laboratory and pilot plant studies include: biochemical and bacteriological studies on fish deterioration aimed at improving the quality of fresh and frozen fish products and product processing, and storage experiments necessary for marketing of quality products.

10. ENVIRONMENT (cont'd)

Environmental Services Program

(Environmental Protection Service)

Regional Office, Halifax

This is the Atlantic regional headquarters for EPS and as such acts as a regulatory and enforcement unit. It conducts standard tests on water, air and waste samples to assure compliance with regulations. The service is responsi to local problems and complaints and often acts in conjunction with other departments of the federal and provincial governments.

(Environmental Management Service)

Water Survey of Canada, Halifax

One hundred and seventy-eight gauging stations provide water quality data on flows and water levels and collect sediment samples. Snow surveys, water resources data collection, network design, data analysis and flow forecasting are also undertaken.

Regional Office, Canadian Wildlife Service, Halifax

The office in Halifax coordinates the activities of the Canadian Wildlife Service in the Atlantic provinces. Some of these activities include: spring and fall surveys of migratory flocks of waterfowl, duck banding, breeding surveys by helicopter, nest record programs and a study of waterfowl habitats. Also studied are the ecology of the snowshoe hare, the structural adaptation of mammals to snow, limnology, ecology, pathology and toxic chemicals in forest spraying.

17. NATIONAL DEFENCE

Defence Services Program

Canadian Forces Technical Support Agency, Halifax

The network of Canadian Forces Technical Services Agencies (CFTSA) across Canada is responsible for various technical support services including quality repair

Federal Scientific Establishments in NOVA SCOTIA, 1973

17. NATIONAL DEFENCE (cont'd)

of equipment and the inspection of certain materials purchased by the department to ensure their high standards.

Defence Research Board

Defence Research Establishment Atlantic, (DREA), Dartmouth

This DRB establishment is one of two with major responsibilities for research in support of both the sea and air components of Canada's Maritime forces. Three areas dominate DREA's activities: underwater acoustics concerned with the detection and tracking of submarines, the hydrodynamics of systems and equipment such as hydrofoils and submerged towed bodies, and the provision of assistance to the Maritime components of the Canadian Armed Forces by application of relevant science to their needs.

In the field of submarine detection, communications theory is being applied to signal processing with the particular aims of computer-assisted detection and optimum array processing. Measurements were also made of reverberation and noise from sea-ice near the edge of an ice pack to find target-masking effects, should a submarine seek sanctuary under the pack.

The role of DREA's hydrodynamics research is to explore, develop and validate concepts for improving the effectiveness of naval ships and their equipment. Their experiments on a large scale in open water are meant to be complementary to those of larger allied laboratories possessing major hydrodynamics facilities including towing tanks.

Direct scientific assistance is given to the Canadian Armed Forces - and Maritime Command in particular - through its Dockyard Laboratory and its Service Projects Unit. The former provides service in such fields as engineering and chemistry while the latter provides ready-access technical assistance to the Canadian Armed Forces on current problems in antisubmarine warfare.

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20. NATIONAL RESEARCH COUNCIL

Atlantic Regional Laboratory, Halifax

The Atlantic Regional Laboratory at Halifax is engaged in practical and fundamental studies in chemistry and biology related to the resources and industries of the Atlantic provinces. Such studies include investigations of: the biochemistry and physiology of marine algae, fungi, bacteria, lichens, mosses and higher plants; the chemistry of naturally occurring organic compounds; and the physical chemistry of inorganic compounds at high temperatures. A major objective is to develop varieties of seaweeds and other marine algae. Surveys are being made to reveal new sources of seaweeds. An applied project on toxic microfungi in pastures is being carried out in collaboration with the Canada Department of Agriculture at Nappan, N.S. Fundamental studies on inorganic reactions at high temperatures may be of value to the steel and glass-making industries, and research in organic reactions, which includes work on methods of synthesis, may also eventually have industrial value. Some of the work in biochemistry and physiology is related to medicinally important compounds such as antibiotics and drugs that affect mental processes.

Regional Office, Division of Building Research, Halifax

The regional office supplies technical information to the construction industry on matters of local concern. It distributes copies of publication on request. The Halifax office also conducts research on the performance of cladding materials in wet maritime climates.

26. VETERANS AFFAIRS

Camp Hill Hospital, Halifax

All research is oriented to the study of geriatrics. Particular projects have studied bronchitis and the effects of dextrin.