Provincial Geologists Journal | Journal des Géologues Provinciaux

1984

VOLUME TWO

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Committee of Provincial Geologists

Publication annuelle du
Comité des Géologues Provinciaux

CONTENTS

1984

PROVINCIAL GEOLOGISTS JOURNAL
JOURNAL DES GEOLOGUES PROVINCIAUX

VOLUME 2

PUBLICATION ANNUELLE DU

COMITE DES GEOLOGUES PROVINCIAUX

PUBLISHED ANNUALLY BY

COMMITTEE OF PROVINCIAL GEOLOGISTS

FOREWORD

The second volume of the Provincial Geologist Journal, published again as a cooperative undertaking by the Committee of Provincial Geologists, should test if a need exists for such a publication in Canada. The first volume, although highly acclaimed by those who have had an opportunity to use it, did not in some provinces reach the public, academia and industry in the scope the committee wished for.

Through the Journal the committee complements the geological surveys mandate in assisting the industry and public in a nationwide search for and development of mineral resources and supports the resource management by the provincial and territorial governments in Canada. The members of the committee believe that yearly compilation of work done throughout all provinces and territories is a unique source of information not available in any other publication.

I would like to acknowledge the key individuals and institutions who compiled the various parts of the Journal, Volume 2:

Jean-Louis Caty, Ministere de l'Energie et des Resources, Quebec, for producing organizational charts; G. McArthur and W.J. McMillan, Ministry of Energy, Mines and Petroleum Resources, B.C., for compilation of geological survey expenditures; G. Kendrick, Ontario Geological Survey, for extensive compilation of Geological Program Highlights and Geological Publications by Geological Surveys; P.S. Giles, Nova Scotia Department of Mines and Energy, for summarizing dates of Open Houses and Public Discussion Forums; and E. Jackson, Department of Natural Resources, N.B. for the feature article summarizing mining rights legislations in the provinces and territories.

The Committee message was provided by the 1984/85 Chairman, J.B. Hamilton.

The major responsibility for the second volume, the overall compilation and production, rests with the Alberta Research Council and I am most thankful to Frank Tuck, editor of the Council and J.R. MacGillivray of the Geological Survey Department who managed the second volume publication.

The Provincial Geologists Journal is available in each province and territory through the offices of geological surveys or relevant information centres or distribution offices of mineral resources departments of provincial or territorial governments.

In order to examine the role of the publication, the committee invites all opinions and critical comments to the selected contents of the Journal and its needs.

Ivo Tyl,
Department of Energy and Natural Resources, Alberta

THE COMMITTEE

OF

PROVINCIAL GEOLOGISTS

THE COMMITTEE OF PROVINCIAL GEOLOGISTS

BY JOHN B. HAMILTON

Chairman - 1984

The Committee of Provincial Geologists was formally established in 1976 at the 33rd annual meeting of the Provincial Ministers' of Mines in St. John's, Newfoundland. The committee is a successor to a Task Force on the submission of Exploration Data that had been established 4 years earlier at the 29th annual meeting in Edmonton. This Task Force - chaired by Quebec and with a representative from each province reported to the Mines Ministers Conference in 1973 and again in 1974. It thereafter remained dormant until, at the St. John's meeting, it was reactivated as the standing sub-committee of Provincial Geologists under Committee #1. Following the structural changes that took place in the conference at the Victoria meeting in 1981 the committee was given its present name and status.

The committee consists of the directors of Geological Surveys or their equivalents in each of the provinces and territories. Meetings are held regularly twice a year - once at the annual Ministers' of Mines Meeting and again in the spring in association with the Prospectors and Developers Association meeting in Toronto. The committee's mandate in brief is "to coordinate geological affairs between the provinces, promote uniformity where this is desirable and provide scientific and resource liaison with industry in regard to exploration and development".

Activities of the committee during the year arose directly out of this mandate. Discussions took place between us and representatives of the Geological Survey of Canada, the Resource Supply and Information Branch, EMR, the Geological Association of Canada, the Yukon Chamber of Mines, the Canadian Geoscience Council and the Mineral Exploration Liaison Committee of the Prospectors and Developers Association. A broad spectrum of matters relating to earth science and mineral exploration and development were considered including: drill core management, exploration statistics, mineral exploration research, map standards, publication policies in each of the provinces, provincial participation in the annual PDA meeting, existing provincial exploration incentives, federal-provincial mineral agreements, in addition to many other topics.

One of the most important activities of the committee lies in information exchange and promotion, and to this end, a provincial program was again this past year organized at the PDA meeting in Toronto. The recent work of all the provincial and territorial surveys were presented there in the form of poster displays and several committee-sponsored papers were presented as part of the PDA general program.

The response to the recommendation of the Committee of Provincial Geologists that technical liaison committees be established in each of the provinces has been excellent. At present such committees now exist or are in the process of being formed in nearly all provinces and territories. While the role of these committees varies from province to province the common purpose of each is to provide guidance and suggestions to the respective provincial surveys on the types of research and projects that would be most effective for mineral development.

For several years the committee has been interested in establishing liaison with our counterparts in the United States, the Association of American State Geologists in order to discuss areas of common concern, for example, matters such as the coordination of geological survey activities across respective provincial and state borders. This year a representative of our Committee was invited to attend and address the Annual State Geologists meeting in Duluth, Minn.

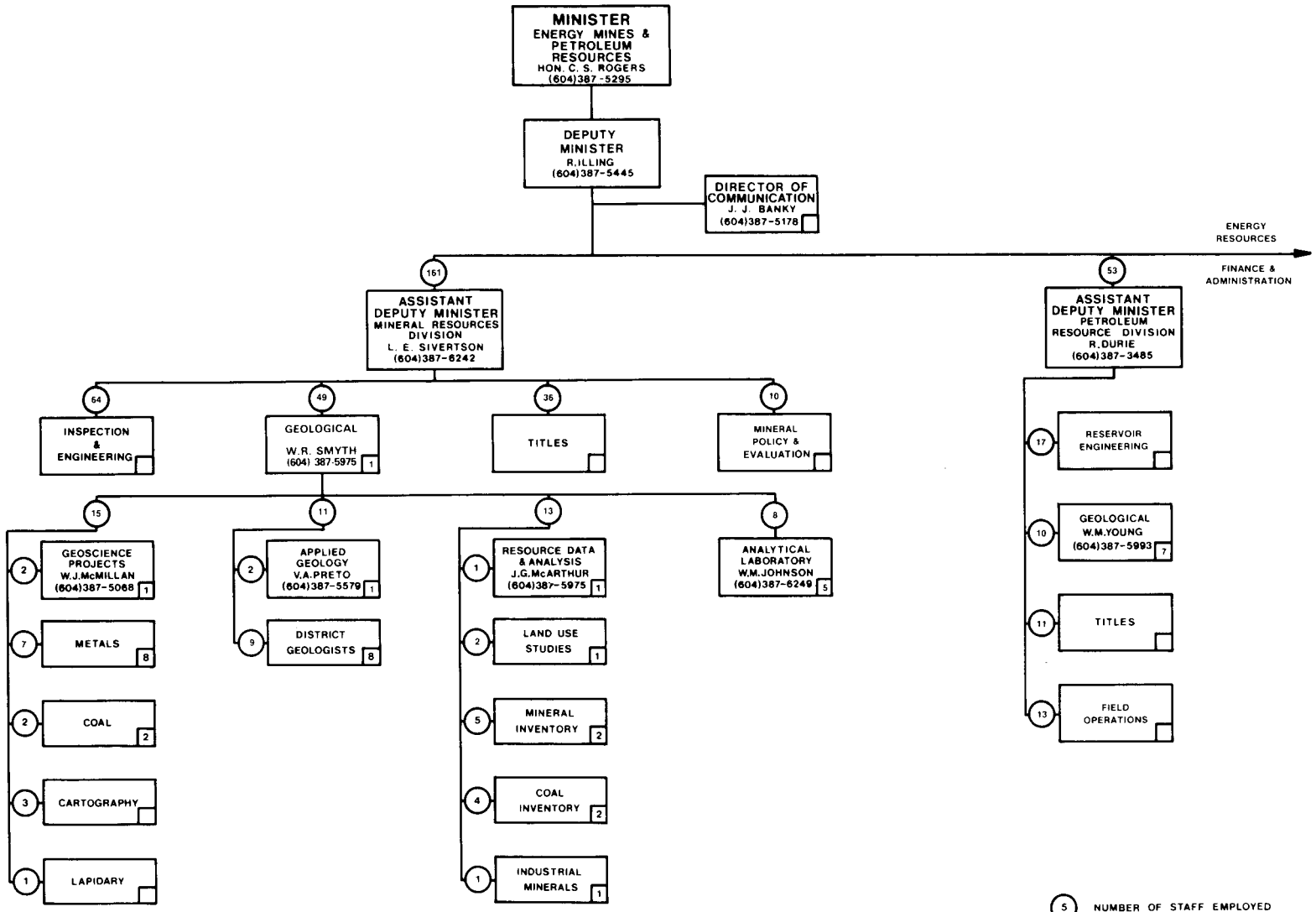
Further future contact between our groups is planned.

Several changes have occurred in the committee membership during the year. Ed Pye (Ontario) and Atholl Sutherland Brown (British Columbia) have retired. Dr. Pye has been succeeded by Vic Milne but at the time of writing a permanent British Columbia representative has not yet been appointed. Grant Mossop (Alberta) has resigned from the Committee having taken on new responsibilities at the Alberta Geological Survey. His replacement has yet to be named.

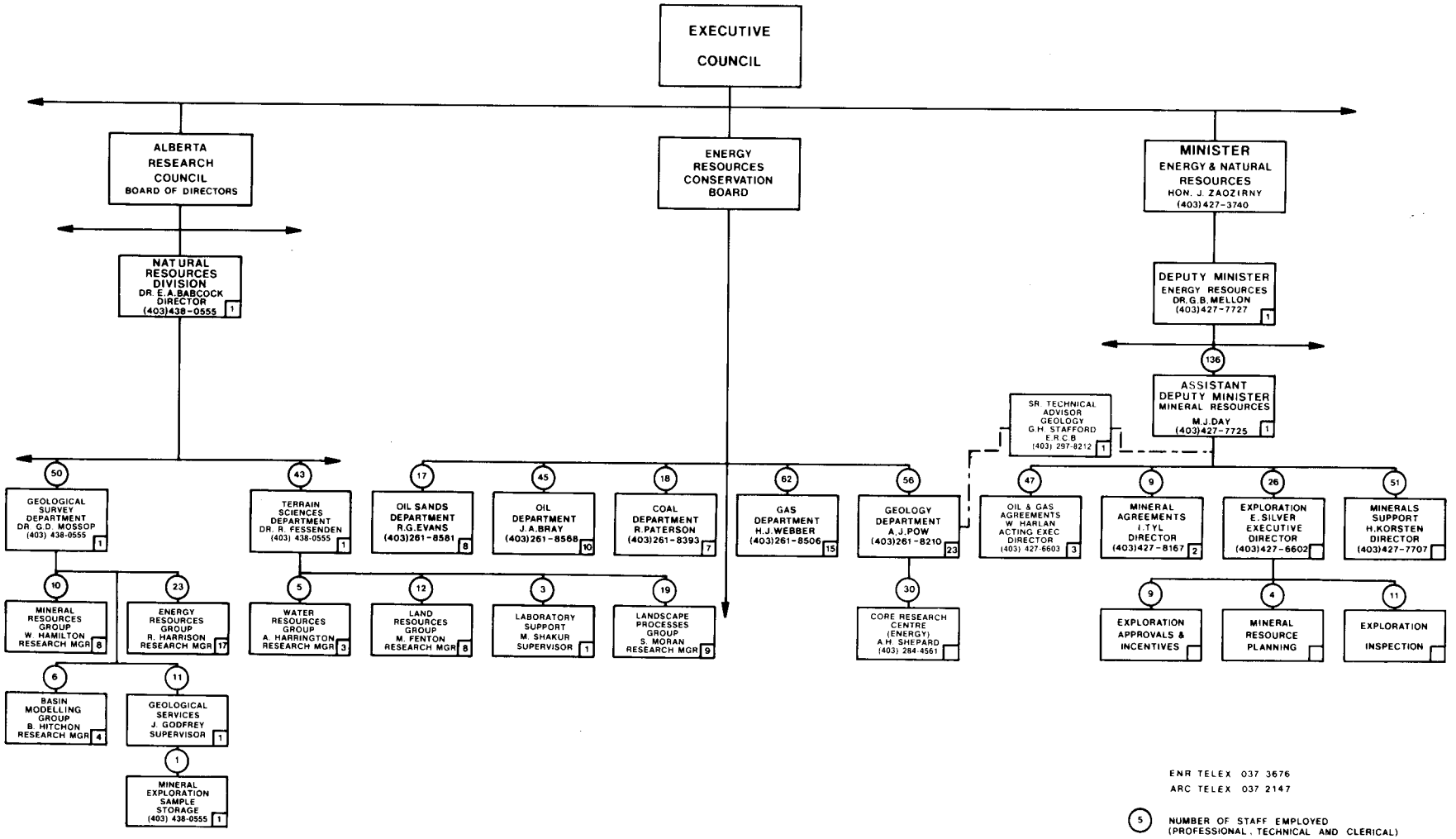
GEOSCIENCE ORGANIZATION CHARTS

Each provincial and territorial government in Canada has developed its own organizational structure for conducting geoscientific survey and research work. Some provinces have what is formally called a Geological Survey (e.g. Ontario Geological Survey), but in most jurisdictions the main elements of the geological survey function are embraced in one or more Branches or Divisions of provincial Mines/Energy/Natural Resources Departments (e.g. the British Columbia Ministry of Energy, Mines and Petroleum Resources is divided into a Mineral Resources Division and a Petroleum Resources Division, with the bulk of geological survey and research work conducted in the Geological Branch of the Mineral Resources Division). The following organization charts are set out in standard format to help alleviate confusion amongst potential users of provincial geoscience services. The charts contain reference to the lines of reporting of the various units in each hierarchy, the manpower associated with each separate jurisdiction, and the names and telephone numbers of key individuals in each system.

BRITISH COLUMBIA GEOSCIENCE ORGANIZATION CHART



ALBERTA GEOSCIENCE ORGANIZATION CHART



ENR TELEX 037 3676
ARC TELEX 037 2147

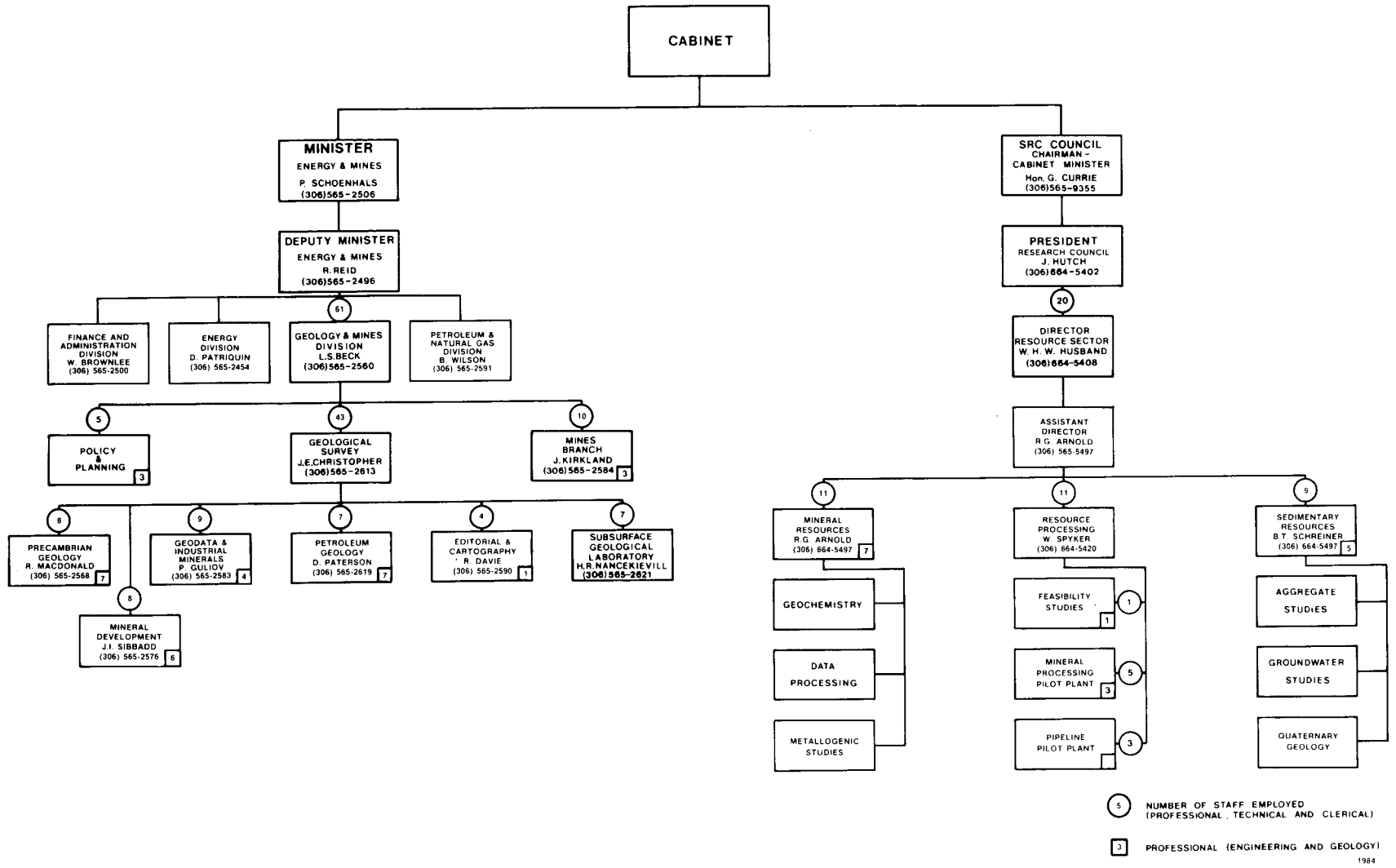
(5) NUMBER OF STAFF EMPLOYED (PROFESSIONAL, TECHNICAL AND CLERICAL)

[3] PROFESSIONAL (ENGINEERING AND GEOLOGY)

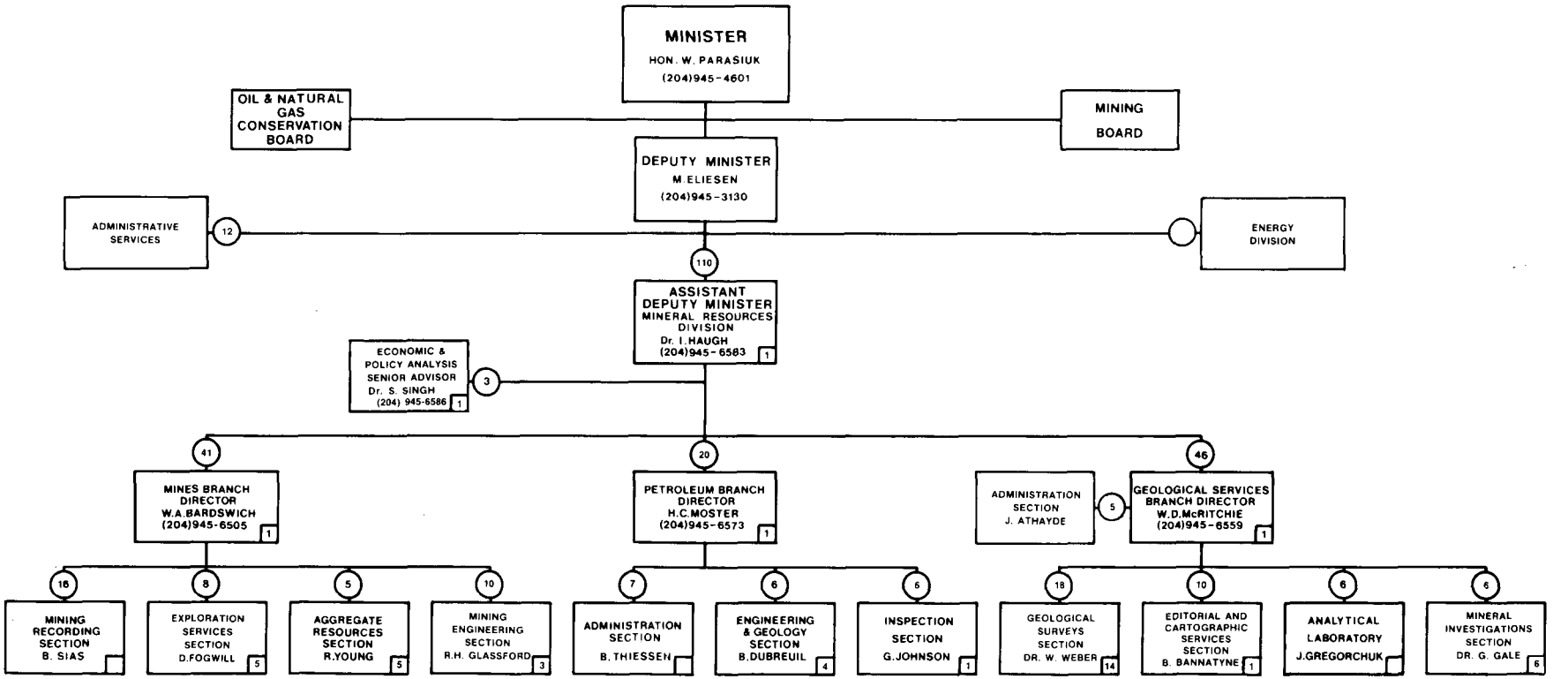
— — — ADVISORY SERVICES (GEOLOGY AND GEOPHYSICS)

SEPTEMBER 1984

SASKATCHEWAN GEOSCIENCE ORGANIZATION CHART



MANITOBA GEOSCIENCE ORGANIZATION CHART

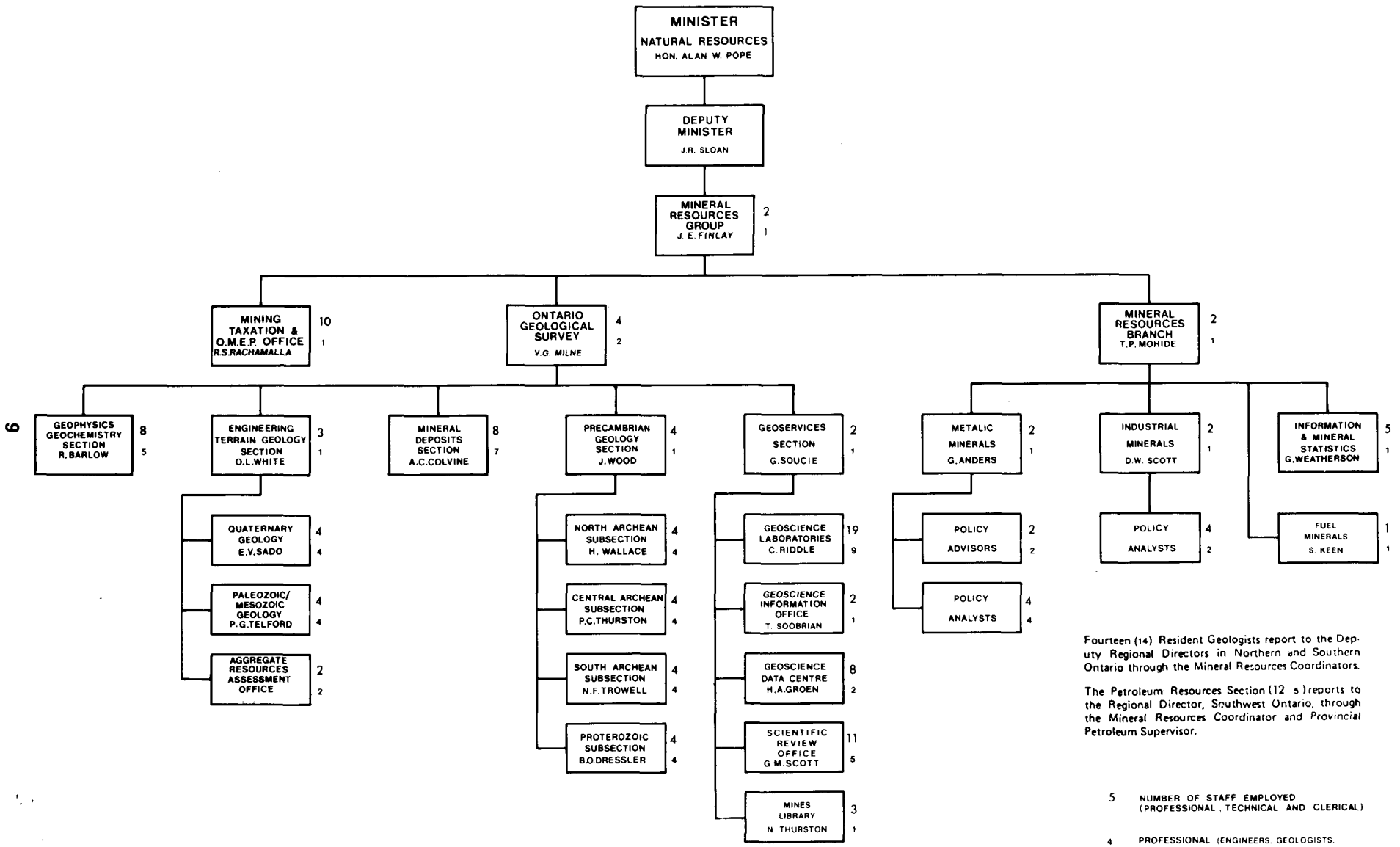


(5) NUMBER OF STAFF EMPLOYED (PROFESSIONAL, TECHNICAL AND CLERICAL)

[3] PROFESSIONAL (ENGINEERING AND GEOLOGY)

1984

ONTARIO GEOSCIENCE ORGANIZATION CHART



Fourteen (14) Resident Geologists report to the Deputy Regional Directors in Northern and Southern Ontario through the Mineral Resources Coordinators.

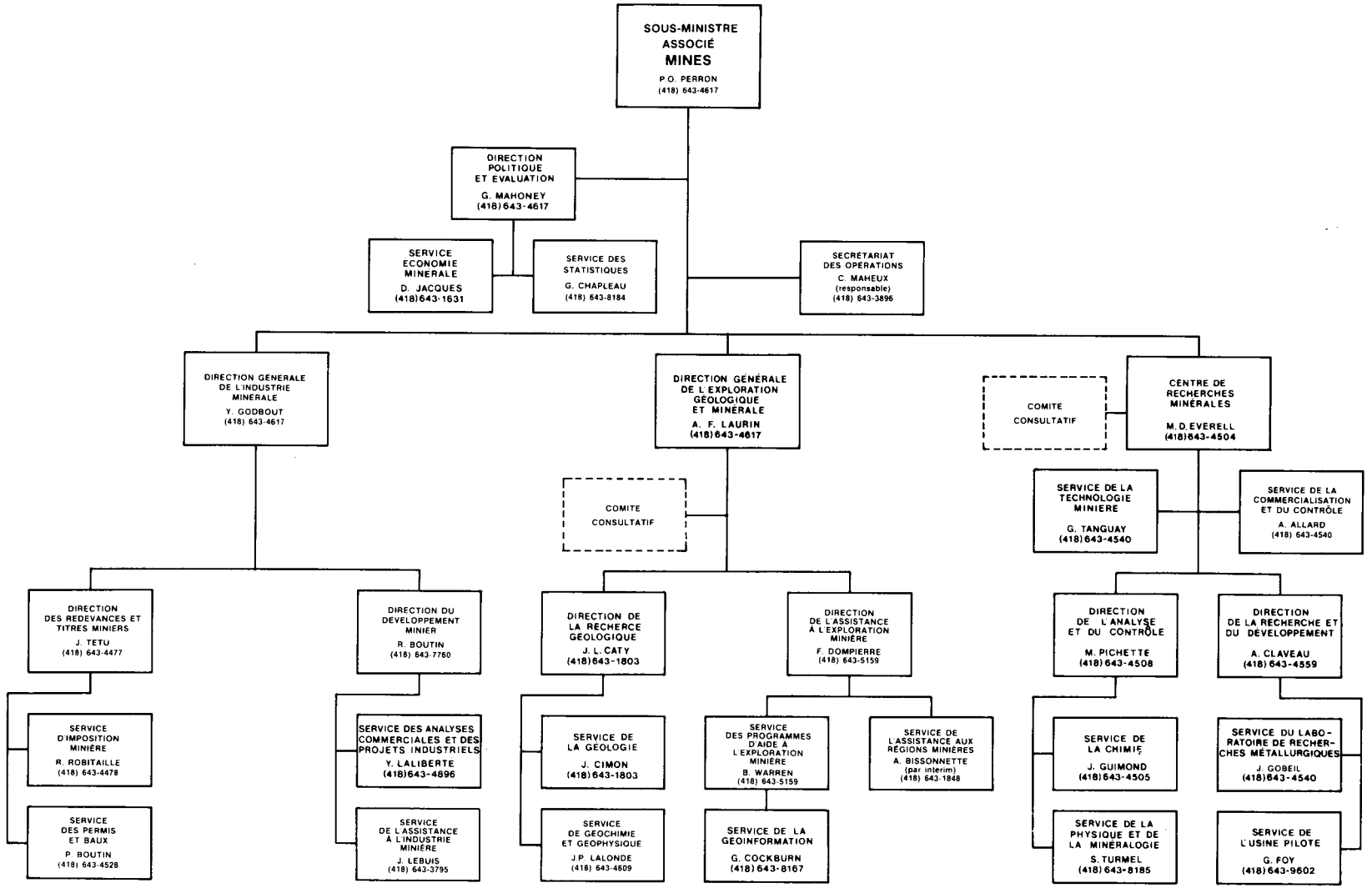
The Petroleum Resources Section (12 5) reports to the Regional Director, Southwest Ontario, through the Mineral Resources Coordinator and Provincial Petroleum Supervisor.

5 NUMBER OF STAFF EMPLOYED (PROFESSIONAL, TECHNICAL AND CLERICAL)

4 PROFESSIONAL (ENGINEERS, GEOLOGISTS, GEOPHYSICISTS, SCIENTISTS)

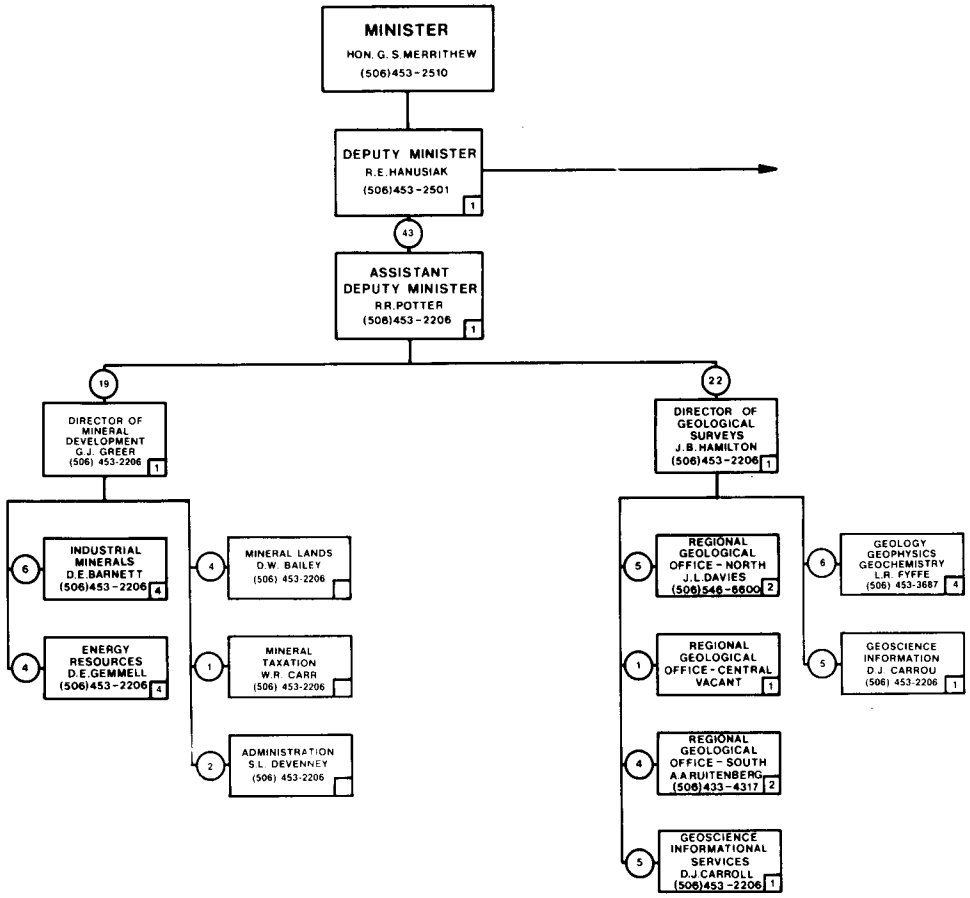
1984

ORGANIGRAMME GÉOSCIENCE DU QUÉBEC



MARS 1984

NEW BRUNSWICK GEOSCIENCE ORGANIZATION CHART



(5) NUMBER OF STAFF EMPLOYED (PROFESSIONAL, TECHNICAL AND CLERICAL)

[3] PROFESSIONAL (ENGINEERING AND GEOLOGY)

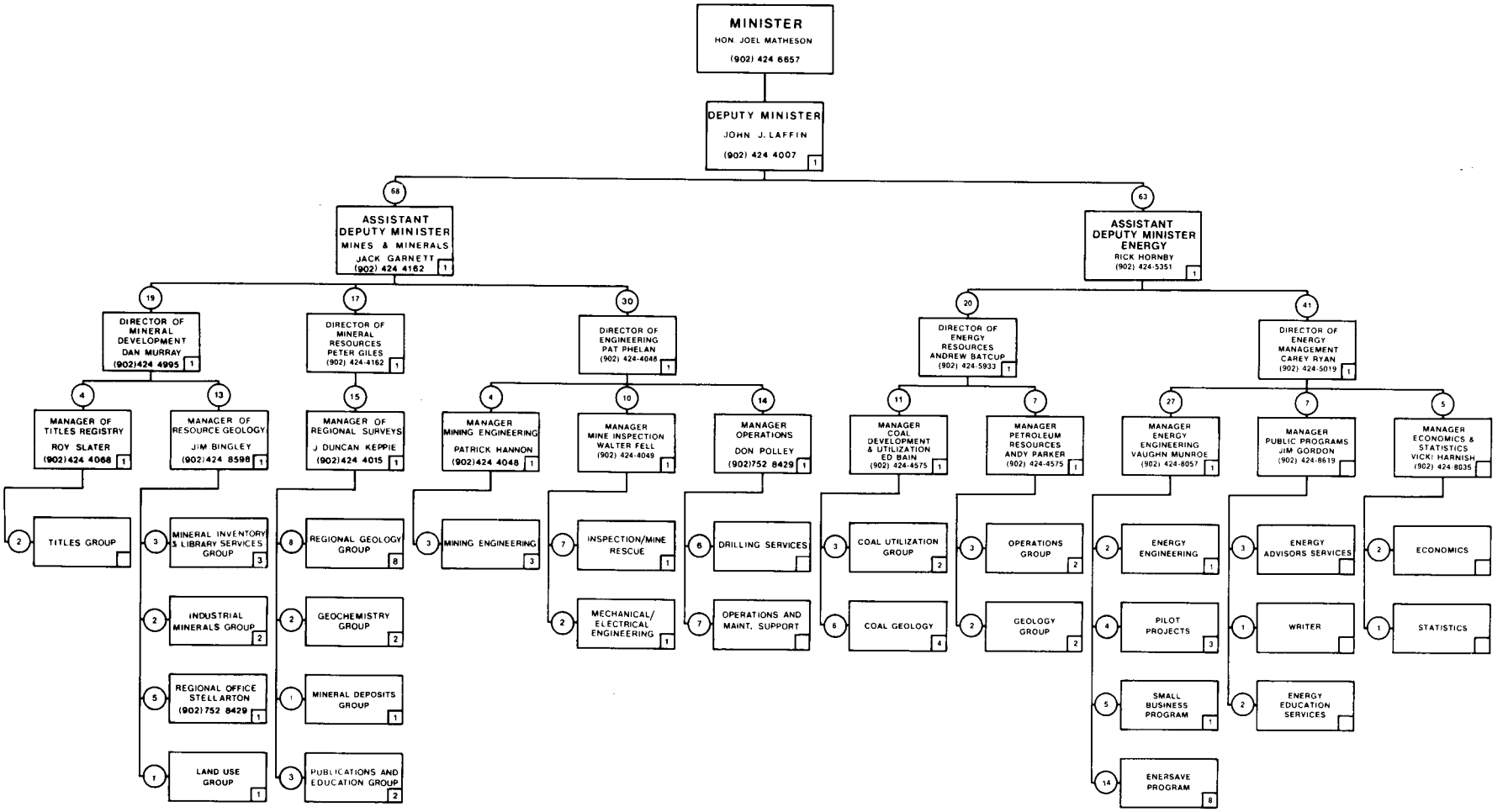
MAY 1984

(5) NUMBER OF STAFF EMPLOYED (PROFESSIONAL, TECHNICAL AND CLERICAL)

[3] PROFESSIONAL (ENGINEERING AND GEOLOGY)

1984

NOVA SCOTIA GEOSCIENCE ORGANIZATION CHART

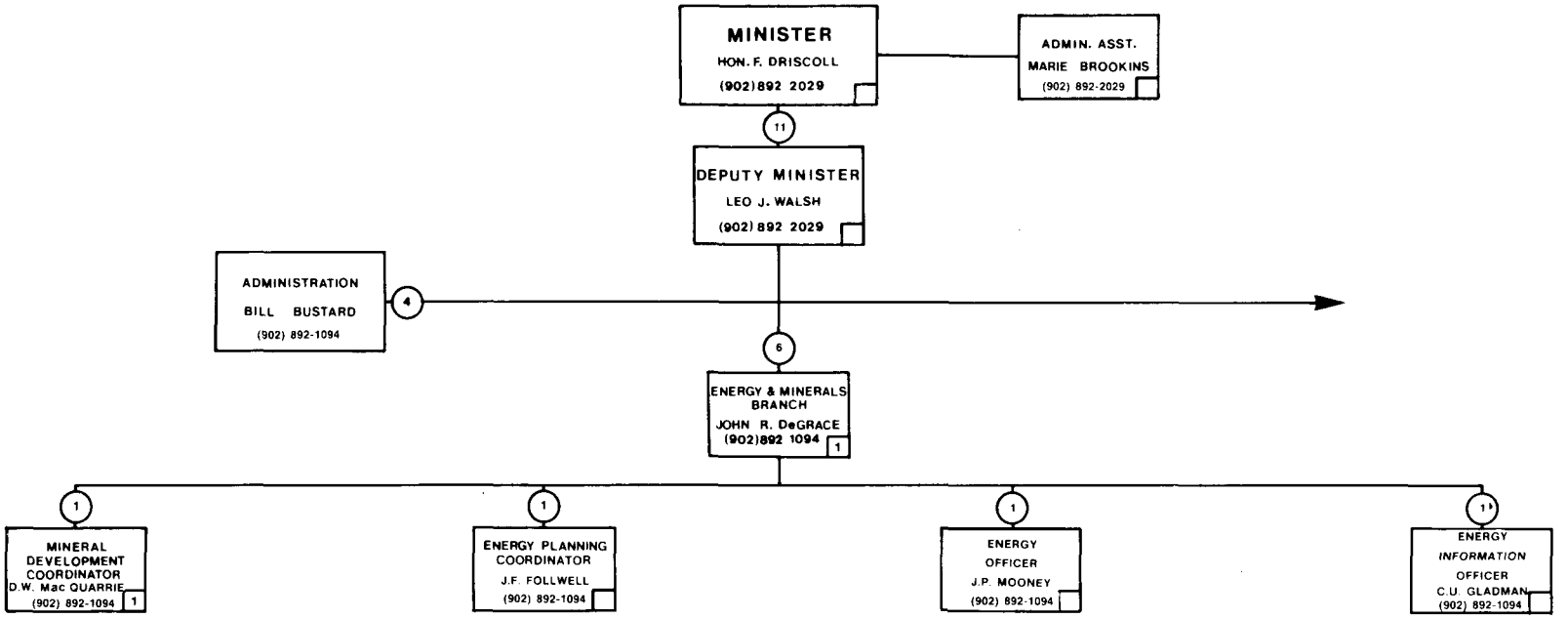


(6) NUMBER OF STAFF EMPLOYED (PROFESSIONAL, TECHNICAL AND CLERICAL)

[2] PROFESSIONAL (ENGINEERING AND GEOLOGY)

JUNE 1984

PRINCE EDWARD ISLAND GEOSCIENCE ORGANIZATION CHART

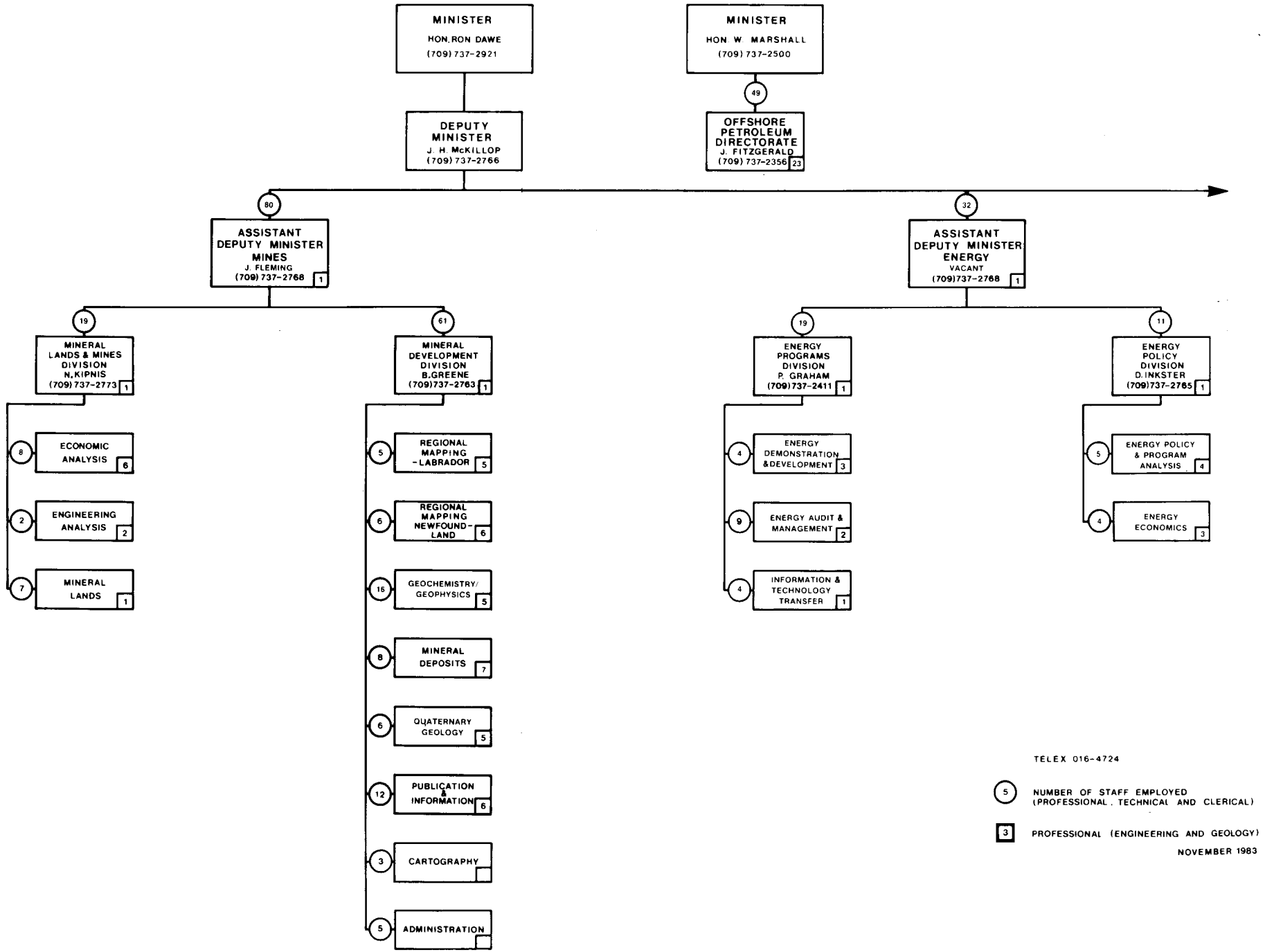


(5) NUMBER OF STAFF EMPLOYED (PROFESSIONAL TECHNICAL AND CLERICAL)

[2] PROFESSIONAL (ENGINEERING AND GEOLOGY)

APRIL 1984

NEWFOUNDLAND GEOSCIENCE ORGANIZATION CHART



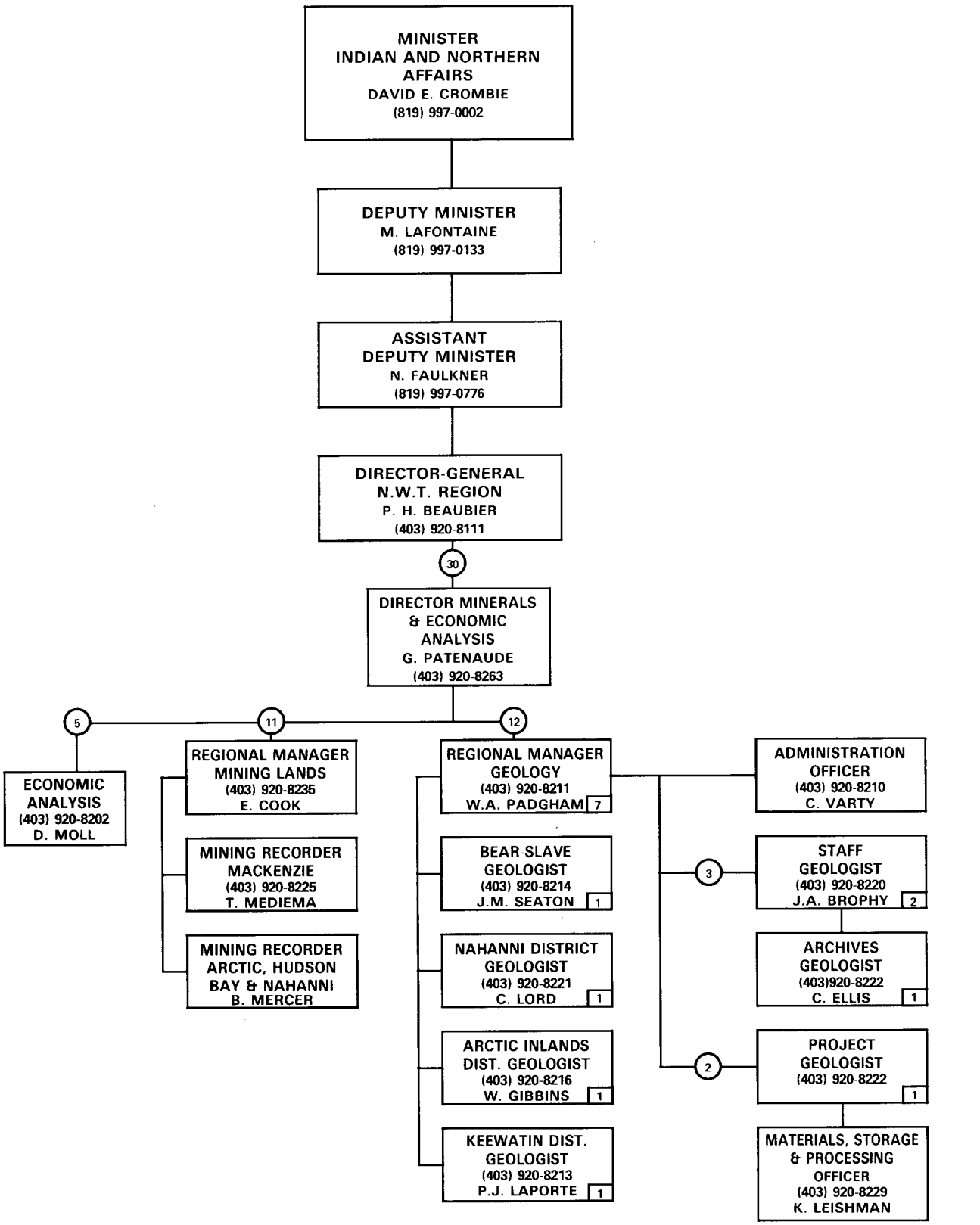
TELEX 016-4724

(5) NUMBER OF STAFF EMPLOYED (PROFESSIONAL, TECHNICAL AND CLERICAL)

[3] PROFESSIONAL (ENGINEERING AND GEOLOGY)

NOVEMBER 1983

NORTHWEST TERRITORIES GEOSCIENCE ORGANIZATION CHART

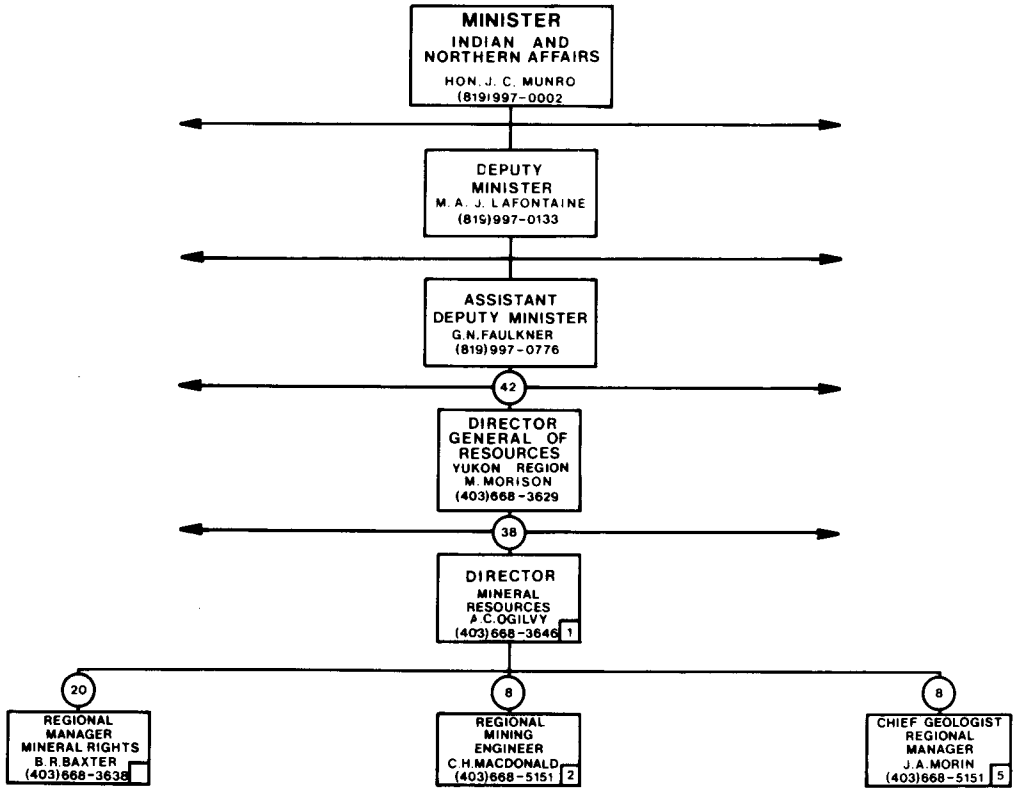


(5) NUMBER OF STAFF EMPLOYED (PROFESSIONAL, TECHNICAL AND CLERICAL)

[3] PROFESSIONAL (ENGINEERING AND GEOLOGY)

NOVEMBER 1983

YUKON GEOSCIENCE ORGANIZATION CHART



(5) NUMBER OF STAFF EMPLOYED (PROFESSIONAL, TECHNICAL AND CLERICAL)

[3] PROFESSIONAL (ENGINEERING AND GEOLOGY)

NOVEMBER 1983

PROVINCIAL GEOLOGICAL SURVEY EXPENDITURES, 1983-84

Summary tables of expenditures of provincial surveys have been published in the Proceedings of the Mines Minister's Conference for four years and were available the year previous in the report of the Committee of Provincial Geologists. Previously the tables were composed of budget estimates by some provinces but now they represent expenditures.

Last year's figures appeared in Volume 1 of the Provincial Geologists Journal. This year, as with last year, the Yukon and Northwest Territories are included.

PROVINCIAL GEOSCIENCES EXPENDITURES
1983-84

PROVINCE/ TERRITORY	SURVEY EXPENDITURES $ X 10^6	% OF TOTAL	TOTAL VALUE OF PROVINCIAL MINERAL PRODUCTION $ X 10^6	SURVEY EXPENDITURES AS % OF TOTAL VALUE OF PROVINCIAL MINERAL PRODUCTION	AREA OF PROVINCE/TERRITORY km^2 X 10^3	SURVEY $ SPENT/km^2	POPULATION (1981) X 10^3	SURVEY $ SPENT/CAPITA
NFLD.	2.9	4.7	625.9	0.46	405	7.2	568	5.1
N.S.	5.4	8.8	292.1	1.85	55	98.2	847	6.4
P.E.I.	-	-	1.5	-	6	0	123	-
N.B.	1.5	2.5	517.5	0.29	73	20.5	696	2.2
QUE.	15.9	26.0	2 006.1	0.79	1 541	10.3	6 438	2.5
ONT.	17.6	28.8	3 173.0	0.55	1 069	16.5	8 625	2.0
MAN.	2.0	3.3	511.4	0.39	650	3.0	1 026	1.9
SASK.	2.1	3.4	2 191.0	0.10	652	3.2	968	2.2
ALTA.	9.0	14.7	20 155.4	0.04	661	13.6	2 238	4.0
B.C.	3.1	5.1	2 841.7	0.11	948	3.2	2 744	1.1
YUKON	0.7	1.1	167.9	0.42	483	1.4	23	30.4
N.W.T.	1.0	1.6	598.6	0.18	3 380	0.2	46	21.75
TOTAL	**61.2**	**-**	**33 081.9**	**-**	**9 922**	**-**	**24 343**	**-**

PROVINCE: BRITISH COLUMBIA
1983–1984

PROGRAMS	SURVEY/ RESEARCH AGENCY	FUNDING AGENCY	NO. OF PROJECTS (OR FACILITIES)	PERMANENT[1] SMY	CASUAL SMY	SALARIES PERMANENT $	SALARIES CASUAL/ TEMPORARY $	OPERATING EXPENDITURES $	TOTALS $
Chief's Office	GB (MRD)	EMPR	1	2	-	72 361	-	24 765	97 126
Core Repositories	GB (MRD)	EMPR	1[2]	1	-	21 000	-	1 000	22 000
Geochemical Surveys:									
(1) Bedrock	GB (MRD)	EMPR	-	-	-	-	-	-	-
(2) Drainage	GB (MRD)	EMPR	1	-	-	?	5 000	95 000	100 000
(3) Soil	-	-	-	-	-	-	-	-	-
Geological Surveys, Bedrock:									
(1) Reconnaissance (>1:100 000)	-	-	-	-	-	-	-	-	-
(2) Detailed (>1:50 000)	GB (MRD)	EMPR	15	15	3	542 125	66 381	130 258	738 764
Geological Surveys, Surficial:									
(1) Reconnaissance (>1:100 000)	-	-	-	-	-	-	-	-	-
(2) Detailed (>1:50 000)	GB (MRD)	EMPR	1	1	-	-		-	-
Geophysical Surveys:									
(1) Airborne electromagnetic									
(2) Airborne magnetic									
(3) Ground magnetic									
(4) Gravity									
(5) Seismic									
(6) Radiometric									
Hydrogeological Surveys	OM	-	-	-	-	-	-	-	-
Education	GB (MRD)	EMPR	13	1	-	33 456	-	21 155	54 611
Laboratory Analysis	GB (MRD)	EMPR	9	8	-	296 600	-	92 454	389 054
Mineral Deposit Inventory and Analysis	GB (MRD)	EMPR	4	14	2	400 000	30 000	140 000	570 000
Oil and Gas Inventory and Analysis	GB (PRD)*	EMPR	2	11	-	320 224	-	106 355*	421 579
Publications	EMPR	EMPR	-	-	-	-	-	-	-
District Geologist's Office	GB (MRD)	EMPR	7	7.5	1	263 374	19 052	61 550	343 976
Petroleum Subsurface Investigations	GB (PRD)*	EMPR	1	1	-	50 000	-	15 000	65 000
Water Resource Inventory and Analysis	OM	-	-	-	-	-	-	-	-
Other:									
Prospectors' Assistance	GB (MRD)	EMPR	83 grants	2.5	-	83 639	-	140 616	224 255
Research Grants	GB (MRD)	EMPR	-	-	-	-	-	-	-
TOTALS:									
GB (MRD)	-	-	-	**55**	**3**	**1 712 555**	**120 433**	**706 798**	**2 539 786**
GB (PRD)	-	-	-	**12**	-	**370 224**	-	**116 355**	**486 579**
Grand Total	-	-	-	-	-	**2 082 779**	**120 433**	**823 153**	**3 026 365**

[1] Full Time Employees
[2] Charlie Lake

GB (MRD) - Geological Branch (Mineral Resources Division)
GB (PRD) - Geological Branch (Petroleum Resources Division)
EMPR - Ministry of Energy, Mines and Petroleum Resources
OM - Other Ministries

PROVINCE: ALBERTA
1983-1984

PROGRAMS	SURVEY/ RESEARCH AGENCY	FUNDING AGENCY	NO. OF PROJECTS (OR FACILITIES)	PERMANENT SMY	CASUAL SMY	SALARIES PERMANENT $	SALARIES CASUAL $	SUPPLIES & SERVICES $
Chief's Office	ARC/ERCB	ARC/ERCB	2	10.0	0	358 000	0	200 000
Core Repositories	ERCB/ARC	ERCB/AENR ARC	2	35.0	3	896 924	60 000	65 000
Geochemical Research/Surveys	ARC	ARC	1	1.0	0	73 000	0	12 000
Geological Surveys, Bedrock:								
(1) Reconnaissance (>1:100 000)	-	-	-	-	-	-	-	-
(2) Detailed (>1:50 000)	ARC	ARC	1	1.0	1.0	60 000	38 000	11 000
Geological Surveys, Surficial:								
(1) Reconnaissance (>1:10 000)	ARC	ARC/AENR TAU/AA	12	10.0	1.2	361 259	36 000	165 000
(2) Detailed (>1:50 000)	ARC	ARC	1	0.25	0	8 000	0	1 000
(3) Reclamation/Environmental Impact	ARC	LCRC/ARC AE/MM	2	10.0	1.0	348 000	21 600	325 000
Geophysical Surveys	-	-	-	-	-	-	-	-
Hydrogeological Surveys	ARC	ARC/AENR	4	10.0	0	317 000	0	74 000
Information and Education	ARC/ERCB	ERCB/ARC	2	3.0	0	133 000	0	30 000
Laboratory Analysis	ARC	AOSTRA/ARC AENR	5	8.0	0	250 000	0	85 000
Mineral Deposit Inventory and Analysis	ARC	ARC/AENR	7	8.0	0	326 464	21 600	124 000
Energy Resource Inventory and Research:								
(1) Petroleum and Natural Gas	ERCB/AENR ARC	ERCB/AENR ARC	3	22.0	0	849 000	0	136 000
(2) Oil Sands	ARC/ERCB	ERCB/ARC AOSTRA	8	14.0	0	667 000	0	150 000
(3) Coal Geology	ARC	AENR/ARC	3	6.5	0	319 000	11 000	210 000
Stratigraphic Research	ERCB/ARC	ERCB/ARC	3	4.0	0	206 000	0	38 000
Other	ERCB	ERCB	3	17.5	0	582 900	0	30 000
TOTALS	-	-	**59**	**160.25**	**6.2**	**5 755 547**	**188 200**	**1 656 000**
Grand Total	-	-	-	-	-			

ARC - Alberta Research Council
AENR - Alberta Energy and Natural Resources
ERCB - Energy Resources Conservation Board
AA - Alberta Agriculture
LCRC - Land Conservation and Reclamation Council
MM - McIntyre Mines
AOSTRA - Alberta Oil Sands Technology and Research Authority
AE - Alberta Environment

PROVINCE: SASKATCHEWAN
1983-1984

PROGRAMS	SURVEY/ RESEARCH AGENCY	FUNDING AGENCY	NO. OF PROJECTS (OR FACILITIES)	PERMANENT SMY	CASUAL SMY	SALARIES PERMANENT $	SALARIES CASUAL/ TEMPORARY $	OPERATING EXPENDITURES $
Administration (Head Office)	SGS	SGS	1	5.0	-	192 000	18 000	71 200
Core Repositories	SGS	SGS	4	7.0	1.3	142 000	21 000	27 000
Geochemical Surveys:								
(1) Bedrock	-	-	-	-	-	-	-	-
(2) Drainage	-	-	-	-	-	-	-	-
(3) Vegetation	SGS	SGS	1	0.0	0.3	-	4 000	5 000
Geological Surveys, Bedrock:								
(1) Reconnaissance (1:100 000)	SGS	SGS	2	4.0	3.9	150 000	80 000	131 000
(2) Detailed (1:50 000)								
Geological Surveys, Surficial:								
(1) Reconnaissance (1:100 000)								
(2) Detailed (1:50 000)								
Geophysical Surveys:								
(1) Airborne electromagnetic								
(2) Airborne magnetic								
(3) Ground magnetic								
(4) Gravity								
(5) Seismic								
(6) Geothermal								
Hydrogeological Surveys								
Information and Education	SGS	SGS	1	-	-	-	-	-
Laboratory Analysis	SRC/UofR Carleton	SGS	3	-	-	-	-	47 000
Mineral Deposit Inventory and Analysis Including Industrial Minerals	SGS	SGS	3	7.0	2.5	289 000	54 000	6 000
Oil and Gas Inventory and Analysis	SGS	SGS	1	6.0	1.0	200 000	15 000	22 000
Publications	SGS	SGS	-	-	-	-	-	81 000
Resident Geologist's Office	SGS	SGS	3	3.0	0.4	148 000	4 800	31 000
Subsurface Investigations	SGS	SGS	5	6.0	1.0	274 000	20 000	21 000
Water Resource Inventory and Analysis	-	-	-	-	-	-	-	-
Metallogenic Mineral Deposit Studies	SGS	SGS	1	1.0	0.6	53 000	11 000	25 000
TOTALS	**-**	**-**	**-**	**39.0**	**11.0**	**144 800**	**227 800**	**467 200**
Grand Total	**-**	**-**	**-**	**-**	**-**		**2 143 000**	

SGS - Saskatchewan Geological Survey
SRC - Saskatchewan Research Council
UofR - University of Regina

PROVINCE: MANITOBA
1983-1984

PROGRAMS	SURVEY/ RESEARCH AGENCY	FUNDING AGENCY	NO. OF PROJECTS (OR FACILITIES)	PERMANENT SMY	CASUAL SMY	SALARIES PERMANENT $	SALARIES CASUAL/ TEMPORARY $	OPERATING EXPENDITURES $
Core Repositories								
Geochemical Surveys:								
(1) Bedrock								
(2) Drainage								
(3) Soil								
Geological Surveys, Bedrock:								
(1) Reconnaissance (1:100 000)	MRD	CAN/MAN	1	2	.26	74 900	8 000	31 000
(2) Detailed (1:50 000)	MRD	CAN/MAN	2	3	1.29	119 300	18 500	21 100
(1:50 000)	MRD	MAN	4	6	2.23	275 100	29 500	76 100
(3) Phanerozoic	MRD	MAN	2	1	.14	46 300	3 600	2 500
Geological Surveys, Surficial:								
(1) Reconnaissance (1:50 000)	-	-	-	-	-	-	-	-
(2) Detailed (1:50 000)	MRD	CAN/MAN	1	1	.25	42 100	7 700	31 200
(3) Resource Management		-	-	-	-	-	-	-
Geophysical Surveys:								
(1) Airborne electromagnetic			-	-	-	-	-	-
(2) Airborne magnetic, gradiometer	MRD	CAN/MAN	-	-	-	-	-	85 000
(3) Ground magnetic								
(4) Gravity								
(5) Seismic								
(6) Radiometric								
Hydrogeological Surveys								
Information and Education,	-	-	-	-	-	-	-	-
Assessment Services	-	-	-	-	-	-	-	-
Laboratory Analysis	MRD	MAN	3	6	-	196 400	-	30 800
Mineral Deposit Inventory	MRD	CAN/MAN	5	4	1.33	179 900	28 200	76 200
and Anayisis	MRD	MAN	6	3	.30	117 400	9 100	18 300
Oil and Gas Inventory and Analysis	-	-	-	-	-	-	-	-
Publications	MRD	MAN	-	-	-	-	-	28 300
Resident Geologist's Office	-	-	-	-	-	-	-	-
Subsurface Investigations, Industrial								
Minerals Drilling and Management	MRD	MAN	2	1	.15	36 300	7 100	18 900
Water Resource Inventory and Analysis	-	-	-	-	-	-	-	-
Other: Administration	MRD	MAN	-	-	-	-	-	142 600
Drafting	MRD	MAN	-	-	-	-	-	14 800
Uranium/Lead Isotope Analysis	MRD	MAN	-	-	-	-	-	800
Strategic Minerals	U of M	CAN/MAN	-	-	-	-	-	25 000
TOTALS	-	-	**26**	**27**	**7.38**	**1 087 700**	**111 700**	**602 600**
Grand Total		-	-	-	-			

[1] Vertical Airborne Gradiometer Surveys (Man.-GSC)

MRD - Mineral Resource Division, Department of Energy and Mines
GSC - Geological Survey of Canada
Man - Manitoba

PROVINCE: ONTARIO
1983-1984

PROGRAMS	FUNDING AGENCY	NO. OF PROJECTS	MAN-YEARS PERMANENT	MAN-YEARS CASUAL	SALARIES PERMANENT $	SALARIES CASUAL $	SALARIES TCSSE $	SALARIES TOTALS $
PRECAMBRIAN GEOLOGY								
Head Office	MNR	2	2	-				
Head Office	MNA/DREI	1	1	-				
Synoptic Mapping	MNR	3	2	2				
Special Mapping	MNR	4	2	4				
Detailed Mapping	MNR	5	5	5				
Detailed Mapping	MNR/MNA	1	1	1				
Detailed Mapping	MNR/DREI	2	1	4				
Detailed Mapping	MNA	1	-	3				
Compilation Mapping	MNR	1	1	-				
		20	17	19	629 000	513 000	388 000	1 530 000
ENGINEERING AND TERRAIN GEOLOGY								
Head Office	MNR	0	1	1				
Quaternary Mapping	MNR	2	2	1				
Quaternary Mapping	MNA/MNR	1	1	1				
Paleozoic Mapping	MNR	2	2	3				
Aggregate Assessment	MNR	3	2	3				
Hydrocarbon Energy Resources Program	MNR	2	2	-				
		10	10	9	398 000	252 000	183 000	833 000
MINERAL DEPOSITS STUDIES								
Head Office	MNR	0	1	-				
Gold	MNR	4	4	2				
Lithophile Mineralization	MNR	1	-	2				
Gold/Iron	MNR	1	1	1				
Silver/Cobalt	MNR	1	0	2				
Industrial Minerals	MNR	3	1	2				
Gold	MNR/DREI	2	-	3				
Gold	MNA	1	-	1				
		13	7	13	240 000	442 000	152 000	834 000

PROVINCE: ONTARIO (Page 2)
1983-1984

PROGRAMS	FUNDING AGENCY	NO. OF PROJECTS	MAN-YEARS PERMANENT	MAN-YEARS CASUAL	SALARIES PERMANENT $	SALARIES CASUAL $	TCSSE $	TOTALS $
GEOPHYSICS/GEOCHEMISTRY								
Head Office	MNR	-	-	1				
Test Range	MNR	1	1	0.5				
Gravity	MNR	1	1	1				
Regional Geochemistry	MNR	1	0.5	2				
Basal Till Survey	MNA/DREI	1	0.5	1				
Geochronology	MNR/MNA	1	-	0.5				
Gradiometer		1	0.5	-				
S.S. Marie Geochemistry	MNA	1	0.5	-				
Acid Lakes Geochemistry	MNR	1	0.5	-				
Airborne Geophysical Survey	MNA	1	0.5	0.5				
		9	**5**	**6.5**	**223 000**	**155 000**	**1 127 000**	**1 505 000**
GEOSERVICES								
Geosciences		-	2	-				
Publications	MNR/MNA/DREI	-	10	12				
Laboratory	MNR/MNA/DREI	-	18	7				
Data Management	MNR/MNA	-	8	8				
Library	MNR	-	2	2				
Information & Education	MNR	-	2	2				
		-	**42**	**31**	**1 153 000**	**890 000**	**901 000**	**2 944 000**
RESIDENT GEOLOGISTS (8 Regions)	MNR/MNA/DREI		30	22	929 000	544 300	463 900	1 937 200
GEOSCIENCE RESEARCH GRANTS PROGRAM	MNR	23					500 000	500 000
EXPLORATION TECHNOLOGY DEVELOPMENT PROGRAM	BILD	20					895 000	895 000
CORE STORAGE	BILD	5	-	3		21 900	1 641 700	1 663 600
HYDROCARBON ENERGY RESOURCES PROGRAM	BILD	7	-	11	-	181 100	3 115 000	3 296 100
TOTALS					3 572 000	2 999 300	9 366 600	15 937 900

MNR - Ontario Ministry of Natural Resources
MNA - Ontario Ministry of Northern Affairs
DREI - Federal Department of Regional Expansion of Industry
BILD - Board of Industrial Leadership Development

PROVINCE: QUEBEC
1983-1984

PROGRAMS	SURVEY/RESEARCH AGENCY	FUNDING AGENCY	NO. OF PROJECTS	PERMANENT STAFF MAN-YEARS P-T-C	CASUAL STAFF* MAN-YEARS	BUDGET ALLOCATION* $
Core Repositories	DGEGM	MER	-	-	2.0	120 000
Geochemical Surveys:	DGEGM	-	-	-	-	-
(1) Bedrock	-	-	2	2P-1T-1C	4.0	702 000
(2) Drainage	-	MER	2	1P	-	789 000
(3) Lakes	-	MER	2	1P	-	515 000
Geological Surveys (Bedrock)	DGEGM	MER	26	11P-2T-1C	34.0	2 925 000
Geological Surveys (Surficial)	DGEGM	MER	3	3P	3.0	310 000
Geophysical Surveys:						
(1) Airborne electromagnetic	DGEGM	MER	6	-	-	3 800 000
(2) Airborne magnetic	-	-	-	-	-	-
(3) Ground magnetic	-	-	-	-	-	-
(4) Gravity	-	MER	2	-	-	650 000
(5) Seismic	-	MER	-	-	-	-
Hydrogeological Surveys	-	-	-	-	-	-
Information and Education	DGEGM	MER	-	-	-	-
Laboratory Analysis	-	-	-	-	-	-
Mineral Deposit Inventory Analysis	DGEGM	MER	19	4P-1C	12.0	2 533 000
Exploration Program	DGEGM	MER	9	2P-2T-1C	5.0	2 715 000
Publications and Carthography	DGEGM	MER	-	8P-19T-14C	10.5	2 878 000
Resident Geologist's Office	DGEGM	MER	4	11P-4T-4C	3.0	1 215 000
Subsurface Investigations	DGEGM	MER	1	-	-	136 000
Joint Venture Agreement	DGEGM	MER	2	-	-	100 000
Other	DGEGM	MER	-	2P-6T-5C	2.0	1 595 000
TOTALS	**-**	**-**	**78**	**45P-34T-27C**	**75.5**	**20 983 000**

* *Permanent and Casual staff salaries in budget allocations*
P Professional
T Technical
C Clerical

DGEGM - Dir. Generale, Exploration Geol. et. Min.
MER - Ministere Energie et Ressources

PROVINCE: NEW BRUNSWICK
1983-1984

PROGRAMS	SURVEY/ RESEARCH AGENCY	FUNDING AGENCY	NO. OF PROJECTS (OR FACILITIES)	STAFF-YEARS PERMANENT	STAFF-YEARS CONTINUING AUXILIARY	STAFF-YEARS SUMMER AUXILIARY	SALARIES PERMANENT $	SALARIES CONTINUING AUXILIARY $	SALARIES SUMMER AUXILIARY $	OPERATING EXPENDITURES $
Core Repositories	GSB	DNR	5	0.2	-	0.4	12 000	-	5 000	12 000
Geochemical Surveys:										
(1) Bedrock	-	-	-	-	-	-	-	-	-	-
(2) Drainage	GSB	DNR	2	-	-	-	-	-	-	30 000
(3) Soil	GSB/MDB	DNR	2	0.1	-	0.8	19 000	-	7 500	3 000
Geological Surveys, Bedrock:										
(1) Reconnaissance (1:100 000)	-	-	-	-	-	-	-	-	-	-
(2) Detailed (1:50 000)	GSB/MDB	DNR	3	3	-	1.2	108 000	-	14 000	65 000
Geological Surveys, Surficial:										
(1) Reconnaissance (1:100 000)	-	-	-	-	-	-	-	-	-	-
(2) Detailed (1:50 000)	-	-	-	-	-	-	-	-	-	-
(3) Granular Resources	MDB	DNR	2	2	-	0.6	55 000	-	6 700	25 000
Geophysical Surveys:										
(1) Airborne electromagnetic										
(2) Airborne magnetic										
(3) Ground magnetic										
(4) Gravity	GSB	DNR	1	0.4	-	0.3	12 000	-	4 000	3 000
(5) Seismic	GSB	DNR	1	0.3	-	0.3	9 000	-	3 000	2 000
(6) Radiometric	-	-	-	-	-	-	-	-	-	-
Hydrogeological Surveys	-	-	-	-	-	-	-	-	-	-
Information and Education	GSB	DNR	2	2	-	-	52 000	-	-	30 000
Laboratory Analysis	GSB	DNR	2	2	-	0.3	36 000	-	3 500	2 000
Mineral Deposit Inventory and Analysis	GSB/MDB	DNR	2	2	-	0.6	70 000	-	7 500	3 000
Coal Inventory and Analysis	-	-	-	-	-	-	-	-	-	-
Oil and Gas Inventory and Analysis	-	-	-	-	-	-	-	-	-	-
Publications	GSB	DNR	-	4	-	-	9 400	-	-	23 000
Resident Geologist's Office	GSB	DNR	2	9	-	-	253 000	-	-	94 000
Subsurface Investigations	-	-	-	-	-	-	-	-	-	-
Peat Inventory	MDB	DREE/CIC	1	-	-	-	-	-	-	26 000
Water Resource Inventory and Analysis	-	-	-	-	-	-	-	-	-	-
Other Studies**	GSB/MDB	DNR	3	-	-	-	-	-	-	41 000
TOTALS	-	-	**28**	**24.8**	-	**3.5**	**720 000**	-	**51 200**	**359 000**
Grand Total	-	-	-	-	-	-			**1 130 000**	

*GSB - Geological Surveys Branch
MDB - Mineral Development Branch
DNR - Depatment of Natural Resources
DREE - Canada Department of Regional Economic Expansion
CIC - Community Improvement Corporation

** Includes potash rock mechanics, digital mapping, and geoscience compilation feasibility studies.

PROVINCE: NOVA SCOTIA
1983-1984

PROGRAMS	SURVEY/ RESEARCH AGENCY	FUNDING AGENGY	NO. OF PROJECTS (OR FACILITIES)	PERMANENT STAFF MAN-YEARS	CASUAL STAFF MAN-YEARS	BUDGET ALLOCATIONS $
Core Repositories	NSDME	NSDME/NSDOD	3	2	1	180 000
Geochemical Surveys:	NSDME/GSC	NSDME/GSC/ NSDOD	1	1	5	420 000
(1) Bedrock	-	-	-	-	-	-
(1) Drainage	-	-	-	-	-	-
(2) Soil	-	-	-	-	-	-
Geological Surveys, Bedrock:	NSDME/GSC	NSDME/GSC/NSDOD	2 NSDME	4	3	535 000
		GSC	5 GSC*	1	5	230 000
(1) Reconnaissance (>1:100 000)	-	-	-	-	-	-
(2) Detailed (>1:50 000)	-	-	-	-	-	-
Geological Surveys, Surficial:	NSDME/GSC	NSDME/GSC	2	1	2.5	191 000
(1) Reconnaissance (>1:100 000)	-	-	-	-	-	-
(2) Detailed (>1:50 000)	-	-	-	-	-	-
Geophysical Surveys:						
(1) Airborne radiometrics	-	-	-	-	-	-
(2) Airborne magnetic (includes VLF-EM)	GSC*	GSC	1	N/A	N/A	300 000
(3) Ground magnetic	-	-	-	-	-	-
(4) Gravity	-	-	-	-	-	-
(5) Seismic	-	-	-	-	-	-
Hydrogeological Surveys	-	-	-	-	-	-
Information and Education	NSDME	NSDME	1	1	-	40 000
Laboratory Analysis (included in budgets above)						
Mineral Deposit Inventory and Analysis	NSDME/GSC	NSDME/GSC/ NSDOD	2	1	0.5	145 000
Coal and Peat	NSDME	NSDME/GSC NSDOD	3	7	5.4	574 000
Oil and Gas Inventory and Analysis	NSDME	NSDME	1	4	-	430 000
Publications	NSDME	NSDME	N/A	10	-	538 000
Resident Geologist's Office	NSDME	NSDME	N/A	11	-	748 000
Subsurface Investigations	NSDME	NSDME	N/A	12	-	360 000
Water Resource Inventory and Analysis	-	-	N/A	-	-	-
TOTALS	-	-	-	**55**	**22.4**	**4 691 000**

* Contribution to Canada-Nova Cooperative Mineral Program, GSC Program
NSDME - Nova Scotia Department of Mines and Energy
NSDOD - Nova Scotia Department of Development
GSC - Geological Survey of Canada

PROVINCE: NEWFOUNDLAND
1983–1984

PROGRAMS	SURVEY/ RESEARCH AGENCY	FUNDING AGENCY	NO. OF PROJECTS (OR FACILITIES)	PERMANENT[1] SMY	CASUAL SMY	SALARIES PERMANENT $	SALARIES CONTRACT[1] $	CASUAL $	OPERATING EXPENDITURES $
Director's Office	NDME	NDME	-	7	2	136 400	28 850	7 800	24 100
Core Repositories	NDME	NDME	3	2	2	32 850	25 250	7 300	15 750
Geochemical Surveys:									
(1) Bedrock	-	-	-	-	-	-	-	-	-
(2) Drainage	NDME	NDME/DEMR	2	3	1	119 400	-	3 100	58 000
(3) Soil	-	-	-	-	-	-	-	-	-
Geological Surveys, Bedrock:									
(1) Reconnaissance (>1:100 000)	NDME	NDME/DEMR	5	5	5	172 550	40 700	24 350	16 750
(2) Detailed (>1:50 000)	NDME	NDME/DEMR	5	5	11	169 100	41 300	53 750	56 800
Geological Surveys, Surficial:									
(1) Reconnaissance (>1:100 000)	-	-	-	-	-	-	-	-	-
(2) Detailed (>1:50 000)	NDME	NDME	5	8	3	82 000	146 350	14 500	55 000
Geophysical Surveys:									
(1) Airborne electromagnetic									
(2) Airborne magnetic									
(3) Ground magnetic									
(4) Gravity									
(5) Seismic									
(6) Radiometric									
Hydrogeological Surveys									
Information and Education	NDME	NDME	-	-	-	-	-	-	-
Laboratory Analysis	NDME	NDME	1	9	2	141 700	26 750	5 050	35 600
Mineral Deposit Inventory and Analysis	NDME	NDME/DEMR	5	9	7	194 200	43 200	42 700	191 900
Publications	NDME	NDME	N/A	18	-	208 100	97 000	-	105 000
Resident Geologist's Office	-	-	-	-	-	-	-	-	-
Subsurface Investigations	-	-	-	-	-	-	-	-	-
Water Resource Inventory and Analysis	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
TOTALS	-	-	**24**	**66**	**33**	**1 256 300**	**449 400**	**158 550**	**558 900**
Grand Total	-	-	-	-	-			**2 423 150**	

[1] Includes long term temporary staff

NDME - Newfoundland Department of Mines and Energy
DEMR - Department of Energy, Mines and Resources, Canada

TERRITORY: NORTHWEST TERRITORIES
1983-1984

PROGRAMS	SURVEY/ RESEARCH AGENCY	FUNDING AGENCY	NO. OF PROJECTS (OR FACILITIES)	PERMANENT SMY	CASUAL SMY	SALARIES PERMANENT $	SALARIES CASUAL/ TEMPORARY $	OPERATING EXPENDITURES $
Head Office (Administration, General Support)	INA	INA	1	2	1	67 000	1 500	74 600
Core Repositories	INA	INA	1	1	3	35 000	3 500	10 000
Geochemical Surveys:								
(1) Bedrock	-	-	-	-	-	-	-	-
(2) Drainage	-	-	-	-	-	-	-	-
(3) Soil	-	-	-	-	-	-	-	-
Geological Surveys, Bedrock:								
(1) Reconnaissance (1:100 000)	-	-	1	-	4	-	6 000	20 000
(2) Detailed (1:50 000)	INA	INA	12*	1.2	2.7	48 000	114 500	184 500
Geological Surveys, Surficial:								
(1) Reconnaissance (1:100 000)	-	-	-	-	-	-	-	-
(2) Detailed (1:50 000)	INA	INA	-	-	-	-	-	-
Geophysical Surveys:								
(1) Airborne electromagnetic	-	-	-	-	-	-	-	-
(2) Airborne magnetic	-	-	-	-	-	-	-	-
(3) Ground magnetic	-	-	-	-	-	-	-	-
(4) Gravity	-	-	-	-	-	-	-	-
(5) Seismic	-	-	-	-	-	-	-	-
(6) Radiometric	-	-	-	-	-	-	-	-
Hydrogeological Surveys	-	-	-	-	-	-	-	-
Education	INA	INA	1	-	-	-	-	-
Laboratory Analysis	INA	INA	1	1	-	5 000	-	5 000
Mineral Deposit Inventory and Analysis	INA	INA	7	-	-	200 300	-	126 400
Oil and Gas Inventory and Analysis	-	-	-	-	-	-	-	-
Publications	INA	INA	2	2.5	-	80 000	-	25 700
Resident Geologist's Office	-	-	-	-	-	-	-	-
Subsurface Investigations	-	-	-	-	-	-	-	-
Water Resource Inventory and Analysis	-	-	-	-	-	-	-	-
Other:								
Prospectors' Assistance	INA	MRD	-	-	-	-	-	30 000
Geological Contracts	INA	-	15	5	-	20 000	-	93 800
TOTALS:								
Geology Division	-	-	-	-	-	**455 300**	**125 500**	**570 000**
Grand Total	-	-	-	-	-		**1 150 800**	

* 1 project conducted jointly with Geological Survey of Canada

Full Time Employees 12
INA — Indian and Northern Affairs, Canada
MRD — Mineral Rights Division, INA

TERRITORY: YUKON
1983-1984

PROGRAMS	SURVEY/ RESEARCH AGENCY	FUNDING AGENCY	NO. OF PROJECTS (OR FACILITIES)	SALARIES PERMANENT SMY	SALARIES CASUAL SMY	SALARIES PERMANENT $	SALARIES CASUAL/ TEMPORARY $	OPERATING EXPENDITURES $
Head Office (Administration, General Support)	INA	INA	1	2.5	-	74 000	-	85 000
Core Repositories	INA	INA	1	1	-	29 000	-	5 000
Geochemical Surveys:								
(1) Bedrock	-	-	-	-	-	-	-	-
(2) Drainage	-	-	-	-	-	-	-	-
(3) Soil	-	-	-	-	-	-	-	-
Geological Surveys, Bedrock:								
(1) Reconnaissance (1:100 000)	-	-	-	-	-	-	-	-
(2) Detailed (1:50 000)	INA	INA	1	-	1	10 000	34 000	16 000
Geological Surveys, Surficial:								
(1) Reconnaissance (1:100 000)	-	-	-	-	-	-	-	-
(2) Detailed (1:50 000)	INA	INA	1	1	.5	40 000	11 000	13 000
Geophysical Surveys:								
(1) Airborne electromagnetic	-	-	-	-	-	-	-	-
(2) Airborne magnetic	-	-	-	-	-	-	-	-
(3) Ground magnetic	-	-	-	-	-	-	-	-
(4) Gravity	-	-	-	-	-	-	-	-
(5) Seismic	-	-	-	-	-	-	-	-
(6) Radiometric	-	-	-	-	-	-	-	-
Hydrogeological Surveys	-	-	-	-	-	-	-	-
Education	INA	INA	1	-	-	-	-	2 000
Laboratory Analysis	INA	INA	1	-	-	-	-	10 000
Mineral Deposit Inventory and Analysis	INA	INA	8	2.5	2	114 000	50 000	75 000
Oil and Gas Inventory and Analysis	-	-	-	-	-	-	-	-
Publications	INA	INA	-	1	-	35 000	-	25 000
Resident Geologist's Office	-	-	-	-	-	-	-	-
Subsurface Investigations	-	-	-	-	-	-	-	-
Water Resource Inventory and Analysis	-	-	-	-	-	-	-	-
Other:								
Prospectors' Assistance	INA	MRD	-	-	-	-	-	24 000
Research Grants	-	-	-	-	-	-	-	-
TOTALS:								
Exploration and Geological Services Division, Yukon	-	-	-	8	3.5	**302 000**	**95 000**	**255 000**
Grand Total	-	-	-	-	-		**652 000**	

Full Time Employees
INA — Indian and Northern Affairs, Canada
MRD — Mineral Rights Division, INA

GEOLOGICAL PROGRAM HIGHLIGHTS

PROVINCIAL AND TERRITORIAL GEOLOGICAL SURVEYS

1983 - 1984

GEOLOGICAL BRANCH MINERAL RESOURCES DIVISION

BRITISH COLUMBIA MINISTRY OF ENERGY, MINES AND PETROLEUM RESOURCES

The Geological Branch is organized into 4 sections. Geoscience Projects, Applied Programs, Resource Data and Analysis, and Analytical Laboratory. The following overview adheres to this structure.

GEOSCIENCE PROJECTS SECTION

Geoscientific mapping, surveys, and related research is provided by the Geoscience Projects Section in order to stimulate and facilitate effective exploration and production of provincial mineral and coal resources. In the course of its work, the section accumulates geological expertise useful in advising government agencies and the mining industry. The exploration industry has a particularly critical need for the products of field mapping and related research produced by the section. Regional geochemical reconnaissance surveys, jointly funded by the federal and provincial governments and conducted by the section with the help of the Analytical Laboratory, have been effective for both exploration and environmental baseline studies.

APPLIED PROGRAMS SECTION

The Applied Programs Section is responsible for monitoring and assisting the field activities of the mineral exploration industry. Geological information on the intensity and distribution of mineral exploration is provided by the section to government and industry for more orderly resource management. The section also offers technical aid and training assistance to prospectors, exploration personnel, and developers.

RESOURCE DATA AND ANALYSIS SECTION

The Resource Data and Analysis Section complies and interprets exploration and development data gathered on coal and mineral resources. This data provides an important source of information that allows government and industry to increase exploration efficiency. The section also helps ensure that mineral lands are properly managed and make assessments of mineral potential on mineral-bearing lands before various land-use dispositions are approved. Most of the exploration industry information collected by the section is made available to the public after a 1-year confidential period.

ANALYTICAL LABORATORY

The Analytical Laboratory conducts a complete range of geochemical analyses in support of the projects conducted by District and Project Geologists of the Branch. Some custom laboratory work is performed for various other government agencies. The laboratory is further responsible for certifying assayers in the province, and through this program controls the quality of work done by commercial mining assay laboratories. Semi-annual Certification in Assaying examinations were held by the laboratory during 1983.

FIELD WORK

The year 1983/84 presented an increased challenge for the Branch to continue to operate and maintain a field presence. Government restraint policies brought about a reduction in staff of 15% — from 62 to 53. With reduced staff, restraint in hiring temporary staff, and lower operating budgets, all projects were kept small or redesigned. None were large (1 geologist, 1 assistant is the norm), none used helicopters extensively. Nevertheless, a moderate field program was achieved.

Major projects include the following (see Table 1), with locations shown on Figure 1.

Other smaller projects are reported along with the above in Geological Fieldwork, 1983 (Paper 1984-1).

TABLE 1: MAJOR PROJECTS — GEOLOGICAL BRANCH (LOCATIONS ON FIGURE 1)

	PROJECT	NTS AREA	MAP SCALE	GEOLOGIST	STAGE	PUBLICATIONS
1	East Kootenay Coalfields	82G	1:10 000	D.A. Grieve*	I	GF 83 PM
2	Purcell Supergroup (Pb, Zn, Ag)	82F,G	1:50 000	T. Hoy	FC	GF 83 PM
3	Sylvester K Gold-Sulphide Prospect	82E/2E	1:4 000	B.N. Church	FC	GF 83
4	Coquihalla Gold Belt	92H/11,14	1:50 000	G.E. Ray	FC	GF 83-81
5	Doctors Point, Harrison Lake (Au, Ag)	92H/5,12 92G/9	1:15 840	G.E. Ray	80%	GF 83
6	Highmont Mine (Cu, Mo)	921/7E	1:1200	W.J. McMillan	FC	GF 83
7	Taseko Lakes Resource Evaluation (Co, Mo, Au)	920/4,5	1:50 000	W.R. Smyth**	10%	GF 83
8	Bowser Basin Coalfields	93L,M 104H	1:10 000	J. Koo	50%	GF 83,82
9a	Peace River Coalfields	930,P,I	1:50 000	W.E. Kilby, A. Legun*	50%	GF 83
b	Butler Ridge	94B	1:50 000	A. Legun*	C	Paper
10	Stewart Area (Au, Ag, Cu)	104B/1	1:10 000	D.J. Alldrick	70%	GF 83
11	Toodoggone Volcanic Field (Au, Ag)	94E	1:25 000	A. Panteleyev T.G. Schroeter* L.J. Diakow***	FC	GF 83,82
12	Alsek-Tatshenshini (Cu, Co, Au)	114P	1:20 000	D.G. MacIntyre	70%	GF 83
13	Industrial Minerals	B.C.	various	Z.D. Hora** Y.T.J. Kwong†	C	GF 83
14	Precious Metal Deposits of B.C.; part is Au deposits	B.C.	1:2 000 000	T.G. Schroeter* A. Panteleyev	75%	—
15	Gold-silver Deposits of Northern B.C.	N. B.C.	—	T.G. Schroeter*	C	CIM Paper
16	Regional Geochemical Survey	93M,N		W.J. McMillan	C	RGS 10,11 GSC Open File
17	Geothermal Potential Map of B.C.	B.C.	1:2 000 000	B.N. Church K.A. McAdam††	C	

* District Geologist
** RDA Geologist
*** Graduate Assistant
† Laboratory Mineralogist
†† Petroleum Resources Branch

C — complete
FC — Fieldwork complete
I — in progress

GF — Geological Fieldwork
PM — Preliminary Map

Additional highlights include the following:

- Field assessment of areas proposed for park or ecological designation, including Wokkpash Valley, Brent Mountain, and Cluckata Ridge.
- Major input in organizing and running field trips, and giving talks at the highly successful Victoria '83 Joint Annual GAC/MAC/CGU Meeting in May 1983. There were more than 1200 registered delegates.
- Major involvement in organizing CIM District 6 Meeting in October 1983 and 5 technical presentations at the meeting.
- Updating of the Mineral Assessment Report Index/MINFILE/COALFILE data bases.
- Field studies were conducted on building stone, barite, and magnesite resources.
- A pilot study examined titanium in tailings from open pit copper mines in the province.
- Participation in joint Canada/Japan coal liquefaction studies.
- Presentation of a paper at the Prospectors and Developers Meeting in Toronto.
- Technical presentations given in a GAC Cordilleran Section Annual Meeting and the Northern Resources Conference in Whitehorse.
- 15-day advanced prospector training course run at Cowichan Lake, Vancouver Island.

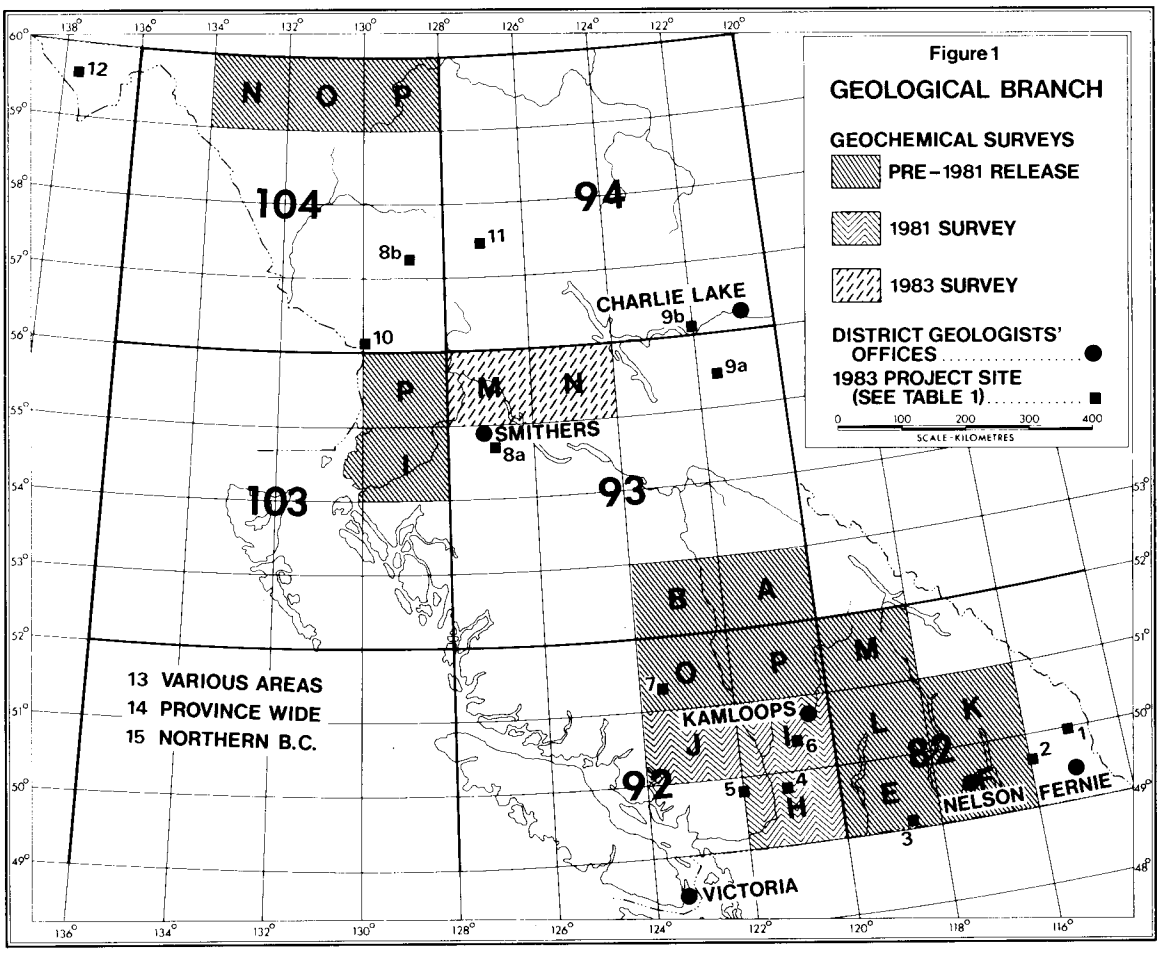


Figure 1 Major Projects — Geological Branch

ALBERTA GEOLOGICAL SURVEY
ALBERTA RESEARCH COUNCIL

Activities of the Alberta Geological Survey during 1984 were organized into 5 sectors: (1) Oil Sands Geology; (2) Sedimentary Geology; (3) Mineral Resources; (4) Environmental Geology; and (5) Basin Analysis. The following overview adheres to this organizational breakdown. Further information on any of the Survey's projects or operations may be obtained by reference to the cited publications or to the Alberta Geological Survey Annual Report of Investigations 1984.

The Alberta Geological Survey is a department of the Natural Resources Division of the Alberta Research Council. Latterly in 1984, the division was reorganized and a new department, Terrain Sciences, was created to focus on problems associated with the development of the surface and near surface resources of the province. This resulted in some restructuring of the Geology Survey Department; the Environmental Geology section was moved into Terrain Sciences and the Alberta Geological Survey is now organized into 3 main research groups: Mineral Resources, Energy Resources, and Basin Modelling.

OIL SANDS GEOLOGY

Regional scale investigations on all of Alberta's major oil sand and heavy oil deposits continued during 1984. These studies are jointly funded by the Alberta Research Council (40%) and the Alberta Oil Sands Technology and Research Authority (60%). A new 18-month contract, effective April 1984 was signed in September.

Each study has 3 essential components:

1. facies analysis and interpretation of depositional environments and paleogeography — in order to develop a predictive capability regarding the 3 dimensional geometry of the oil sand reservoir and the non-reservoir rocks;
2 petrologic characterization of the reservoirs and the enclosing rocks — to develop an understanding of the mineralogy, texture, porosity, and permeability, and to assist with the physical and numerical modelling of the reservoirs; and
3 regional mapping and reservoir characterization of entire deposits (structural maps, isopachs, sand/shale ratio maps, bottom water maps, net pay maps, and so on) — to provide a basis for possible pilot plant siting, and in situ process transferability.

Facies and depositional environment reconstructions are nearing completion for a number of deposits of the Mannville Group. These include the Lower Mannville Gething and McMurray Formations in the Peace River and Athabasca Deposits, the middle Mannville Glauconitic Sandstone of the Suffield area, and the middle and upper Mannville Group formations in the Wabasca Oil Sands and in the Cold Lake-Lloydminster area. In the Subcrop Carbonate Trend, Grosmont Formation facies are now well defined and work is progressing on some of the bitumen-bearing Mississipian formations.

Petrography and diagenesis studies, based on thin-section and scanning electron microscopy, are complete for the Peace River Oil Sands and the Glauconitic reservoirs at Suffield. Important progress has also been made in some of the Cold Lake and Lloydminster pools as well as in the Grosmont Formation dolomites.

Regional subsurface mapping of entire deposits, the third component of each oil sands study, is now completed for the northern part of the Athabasca Deposit and relatively advanced for the Peace River and Wabasca Deposits. A new study on the southern part of the Athabasca Deposit was initiated in the spring of 1984.

Site-specific studies are an additional and important component of Oil Sands Geology, and a number of studies were completed relating to existing or proposed AOSTRA/Industry pilot plants. A detailed reservoir study has been initiated for the Underground Test Facility being developed by the Alberta Oil Sands Technology and Research Authority (AOSTRA). Researchers continue to provide valuable

geological insight into the operations of specific field pilot plants, through involvement in AOSTRA/Industry Technical Advisory Committees. In the international arena, a study of the La Brea de Chumpi oil sands in Peru was completed for AOSTRA and Petro Peru, the government petroleum agency in Peru.

SEDIMENTARY GEOLOGY

Sedimentary Geology embraces the Alberta Geological Survey's activities in coal geology, regional subsurface and petroleum geology, and specialist and support studies in palynology and ichnology. In the coal program, research remains centred on the geology of Cretaceous and Tertiary coal measures in the Alberta subsurface. The objectives are 2-fold:

1. to evaluate the coal resources and identify commercial occurrences of coal in the Alberta plains from near surface to depths of approximately 500 m; and
2. to develop geologic facies modelling techniques which will allow prediction of distribution, thickness, and continuity of coal seams in the Alberta plains region.

Research over the past year has included continued documentation of variations in coal rank within the Ardley zone, and both regional and detailed studies of the Judith River Formation, the Ardley coal deposits of the Scollard Member, and the Horseshoe Canyon Formation. The latter in particular has been the focus of an extensive team-research effort for the area between the U.S. border and Township 64, to provide precise seam correlations, a variety of computer-derived structural, stratigraphic, and seam thickness maps, and (through detailed sedimentological studies) better insight into the primary facies associated with economic coal horizons.

Studies in petroleum geology have been directed towards developing an understanding of oil reservoirs within the Triassic sequences of northwestern Alberta. Several lines of evidence suggest that the stratigraphic pinch-outs which create the reservoir/trapping situations are depositional, rather than erosional as in the more traditional interpretations.

The regional subsurface program is a stratigraphic mapping endeavour jointly sponsored and staffed by the Alberta Research Council and the Alberta Department of Energy and Natural Resources. Four projects are currently active: (1) the regional stratigraphic setting of the Devonian Grosmont Formation; (2) mapping the northern extension of the Leduc (Rimbey-Meadowbrook) reef trend beneath the Grosmont Formation; (3) delineating the stratigraphic relationships between the Jurassic (Rock Creek Member) and Cretaceous sands of west-central Alberta, and (4) stratigraphic correlations within and across the Devonian 'west shale basin' between the West Pembina and Meekwap areas. The first 3 of these projects are nearing completion for publication.

Specialist studies in palynology and ichnology provide fundamental data in support of facies analyses in oil sands, coal, petroleum, and regional subsurface studies. In palynology there are 2 long-term studies presently underway: (1) a study of coal-bearing Late Cretaceous strata in the Red Deer River Valley; (2) a synthesis of work done on the Lower Cretaceous oil sands deposit. A decision by Dr. G. Pemberton to leave the Alberta Geological Survey removes our expertise in ichnology. Nevertheless, a legacy of significant accomplishments can be attributed to the last year: major studies of Hibernia and other East Coast cores completed (on a contractual basis) for Mobil Oil Canada Limited and Shell Canada Limited; important insights into the ichnology of several economically important clastic sequences, and significant progress on definitive publications on biogenic structures and an ichnology nomenclature system.

MINERAL RESOURCES

Mineral resource studies in the Alberta Geological Survey follow several lines. They include resource surveys of specific mineral commodities or groups of commodities. They also include studies of a more basic geological nature, such as bedrock mapping, structural and stratigraphic analysis, geochemistry, and so on, but all with an economic geology drive. As well, they include studies in resource data applications, with a bent towards mineral economics in support of resource management. This past year has been a crossroads point for the current Minerals program, in that most of the studies came to completion. Consequently, much of the year's total effort has gone into preparing manuscripts for the final publication products of these studies. As well, some intensive effort

was spent in identifying optimal directions for new Minerals research.

As reported in the 1983 Annual Report, province-wide inventories of non-metallic mineral resources have now been essentially completed at a reconnaissance scale. Part of those are the studies actually finished this past year, which include industrial clays, Athabasca Basin, alluvial gold, plus some significant components of the aggregate inventory (which is expected to continue to 1990). The research products of these and earlier studies provide a reconnaissance survey of resource potential for the province, and a solid base for planning future minerals research focussed toward more specific needs.

A highlight of 1984 was the completion of the last 13 of the series of 36 geological maps covering the Precambrian Shield in Alberta. The maps are in press and will be incorporated with district reports for publication in the coming year. Also completed are the geophysics and geochemistry study components of the Precambrian project, to be published as separate reports in the next few months. Completion of the mapping, the geophysics and geochemistry studies, and the studies on metamorphic and deformational history published earlier, brings this long-standing project to a close. Products of this work constitute possibly the most detailed geological mapping and most comprehensive petrologic data base of any segment of the Canadian Shield.

The Athabasca Basin study is now in press for publication in the fall of 1984. Completion of this work is a major step forward in understanding one of Alberta's economically significant geological units (for uranium potential). Current follow-up to that work is an investigation of the regolith and crystalline basement rocks that underlie the Athabasca Group sandstones.

Aggregate mapping continues as one of Alberta's most important resource studies. Mapping this year was conducted on a more reconnaissance level. With most of the settled regions of Alberta (encompassing 80% of the population) now mapped at a 1:50 000 scale, attention was directed to more remote areas. In northwestern Alberta, an area equivalent to 4 NTS 1:250 000 sheets was mapped at the corresponding scale. As well this year, a significant effort was directed to computerizing the aggregate data base and integrating certain elements with other information systems.

Placer gold in Alberta's alluvial deposits received some further attention during the year. Results from the previous year's pilot sampling and methodology tests were carefully evaluated and synthesized in a comprehensive report, including a historical review of gold production in Alberta.

Information Geology transgresses the whole of the Alberta Geological Survey activities, but is slotted into Mineral Resources because most of its focus has been there in the development of the GEODIAL bibliographic data base. This data base in the past year has grown essentially to full maturity, now well accepted and well used by the geological community.

ENVIRONMENTAL GEOLOGY

Environmental Geology research in the Alberta Geological Survey falls in 2 main areas: (1) surficial geology and Quaternary stratigraphy of the province, and (2) reclamation, particularly as it relates to the plains coal mines.

Quaternary studies of selected NTS 1:250 000 map sheets comprise 3 elements; surficial geology, Quaternary stratigraphy, and bedrock topography. The Sand River sheet (73L) is now complete with the surfical geology and bedrock topography maps published and the report nearing publication. The work on the Vermillion sheet (73E) is about 2/3 complete. Both studies have revealed widespread and varied types of glacial thrust terrain and a relatively complex stratigraphic record with 12 formations and members defined in the Sand River area. Data on stratigraphy and bedrock topography have important input for other studies: by the Alberta Research Council of the groundwater resources of the Cold Lake Oil Sands deposit; by Alberta Environment; and by petroleum companies concerned with the resources of the area. The Edmonton sheet (83H) is being completed; the stratigraphic record is either less distinct or simpler than that to the east.

Synthesis mapping of southern Alberta, from Latitudes 49° to 54° and the Saskatchewan border to the disturbed belt, is nearing completion. Final results are now published at 1:1 000 000 scale and will be also available at 1:500 000 scale, with the southern part appended to the northern boundary of the Quaternary map of the United States. Mapping this year was concentrated between Latitudes

52° and 54°. Three lithologic suites of continental till are recognized, the upper 2 being traceable throughout most of southern Alberta. The report on a separate Quaternary stratigraphic study in the Medicine Hat-Lethbridge area is nearing completion, with major emphasis on both till stratigraphy and till facies within individual stratigraphic units. The Calgary Urban Geology study is in the final stages of publication preparation.

The study of the Quaternary stratigraphy along the Firebag River north of Fort McMurray is nearing completion. At least 3 till units and associated inter-till stratified deposits have been identified. Work this year concentrated on the geochemistry of the tills.

The study of highwall stability in plains coal mines is continuing, focussed this year on the Lake Wabamun area, with joint funding from TransAlta Utilities and the Alberta Research Council. Using knowledge of glacial thrusting gleaned over a number of years of basic survey and research work together with data from coring projects at the Highvale mine, Alberta Research Council geologists have begun to determine the distribution and structure of the glacially thrust terrain and factors contributing to highwall failures. The project team is also evaluating the use of surface seismic and remote sensing data in detecting thrust terrain and has developed a method of taking oriented core using A-casing. Highwall failures in the thrust sediment appear to be of 3 types: (1) slip along preexisting glacial shear planes within the thrust sediment; (2) block failure due to the thrust debris moving outward along the basal glacial thrust plane, and (3) outward toppling of the bedrock, a failure type typical of the first 10 to 20 m of a new exposure.

In the reclamation area, the Plains Hydrology and Reclamation Project has completed its first 5-year phase. The research is primarily funded by the Alberta Heritage Trust Fund, administered through the Reclamation Research Technical Advisory Committee. The project is targeted to develop a comprehensive understanding of the geology, hydrology, and soil conditions in the area of the Battle River and Lake Wabamun coal mines, with a view to developing a predictive framework for the assessment of reclamation potential on a long term basis. Particular emphasis is placed on determining the impact of mining on water resources. The multifaceted results on the project have been synthesized into 25 draft reports, with others currently in preparation. In general, a number of concerns that led to the establishment of the study have now been allayed on sound scientific grounds. Others require further research and are incorporated into a second phase of 3 years duration, which involves reforming project objectives for more detailed study of the landscapes design aspect of the problem.

BASIN ANALYSIS

Expertise in geochemistry, hydraulics, stratigraphy and sedimentology, mathematical modelling and numerical simulation, and computer data processing and data base management has been integrated into a Basin Analysis Group. Major effort during 1984 was directed at a synthesis of the hydrogeology of the Cold Lake area, including numerical simulation of the existing hydrogeologic situation prior to major commercial in situ recovery operations. A regional reconnaissance of potential waste injection aquifers beneath oil sands and heavy oil areas of Alberta was carried out under contract to Environment Canada; 1 potential injection aquifer in each study area was evaluated with respect to geology, hydrodynamics, and hydrochemistry. In addition, selected injection waters were analyzed, and a preliminary series of phenol adsorption experiments were conducted (using C-14 as a tracer) on cores from the McMurray and Beaverhill Lake Formations in the Cold Lake area. Other research completed includes a synthesis of the relations among geothermal gradients, hydrodynamics, and hydrocarbon occurrences in Alberta, and the use of trace elements for classification of crude oils into families by means of stepwise discriminant function and MRPP statistics.

SASKATCHEWAN GEOLOGICAL SURVEY
SASKATCHEWAN DEPARTMENT OF ENERGY AND MINES

The role of the Saskatchewan Geological Survey is geoscientific, regulatory, and custodial; and is carried out against the background of the metallic, industrial mineral, and petroleum exploration activity in the province. All of these industries, in one or another of their aspects, were on the rise during the year. This is reflected in the work of the Saskatchewan Geological Survey by the rising indices of services rendered.

By nature of the geology of the province, the geoscientific program is divided between the northern and southern regions of Saskatchewan. The region north of a line linking La Loche, La Ronge, and Creighton is characterized by Precambrian igneous, metamorphic, and sedimentary rocks that are host to metallic mineral deposits such as uranium, gold, copper, and zinc. The Saskatchewan Geological Survey through the Precambrian Mapping and Economic Geology Sections conducts inventory work on and studies of these rocks and mineral deposits in order to provide the regional framework against which mining company decisions can be made for exploration and development.

The region to the south is made up of Phanerozoic sedimentary rocks which contain the petroleum, natural gas, potash, coal, sodium sulphate, and clay resources of the province. These strata are mapped and studied by the Sedimentary Research Geology and Industrial Minerals Sections for similar reasons as those in the north.

Regulatory duties of the Saskatchewan Geological Survey are performed under the requirements for the submission of borehole cores, samples, geophysical logs, and map data by industry in the south; and in the north by monitoring of exploration programs. These duties are carried out by the Geodata Section and the Subsurface Geological Laboratory on the one hand, and on the other by the resident geologists at La Ronge and Creighton. Custodial services are also rendered by requirement of the regulations, as well as, by the needs of the geoscientific programs. These include the maintenance of data libraries arising from drilling activities, geophysical exploration, and mineral work assessment on permits and claims under the Oil and Gas Conservation Regulations, the Oil and Gas Disposition Regulations, and the Mineral Disposition Regulations, respectively.

The Saskatchewan Geological Survey also provides a forum for dialogue with industry on the mineral resources of the province by sponsoring symposia through the Saskatchewan Geological Society, by presenting an Annual Open House, by formal liaison meetings with counterparts in the other provinces and Federal Government, through the Committee of Provincial Geologists and the National Geological Surveys Committee, and through individual consultation. Open House 1983 was attended by 200 people, mostly from the metallic mineral industry. Individual consultations by the staff on nonregulatory resource matters exceeded 230.

PRECAMBRIAN MAPPING SECTION

Field parties mapped about 4000 km^2 of the Precambrian Shield north of Fond-du-Lac under the 1983/84 geological reconnaissance program; and 4 coloured regional geological maps at the scale of 1:250 000 were published under the Compilation Geology project.

Review and compilation of the geology of the Beaverlodge area around Uranium City ("Project Beaverlodge") was also continued from the previous year. This program included a field investigation of the Prince Lake vicinity and initiation of a study of the Martin Formation by contract with the University of Saskatchewan.

Other geoscience contracts were implemented with the Universities of Saskatchewan and Regina, and with Carleton University. In addition, an informal liaison was entered into with the University of Kansas for radiometric age determinations of rocks in the Precambrian Shield of Saskatchewan.

The project dealing with the geology of the igneous and metamorphic rocks underlying the Athabasca Sandstone was concluded with the completion of reports and maps for the Open File. Data produced

by this study are particularly of value in connection with the distribution of uranium deposits.

ECONOMIC GEOLOGY SECTION

Uranium and gold deposit geochemical and geological studies were carried out in the vicinity of known occurrences near Uranium City around Nicholson Bay and Goldfields, where both metals have been mined in the past.

Investigations of gold deposits were continued in the Flin Flon-Amisk Lake area, where several past producers, 1 mine nearing production, and numerous excellent mineral prospects are located. The geology and geochemistry of several prospects were studied and the information obtained integrated with data acquired in previous years from other deposits, to provide an overall model of gold deposit formation in the area.

The core collection program undertaken through the office of the resident geologist in La Ronge, was also continued. The collection, housed principally in La Ronge, comprises diamond-drill core from many of Saskatchewan's metallic mineral deposits, as well as other geologically important sites.

Work on a new series of 1:250 000 scale mineral deposit maps was initiated. These maps will augment a similar scale compilation bedrock geology series currently in production, and will document the location, metal association, development status, and type of mineralization deposits, and list all sources of data. The resident geologists, through offices in La Ronge and Creighton, monitor the mineral exploration industry in northern Saskatchewan and also service it by providing up-to-date information on exploration and mining activities and opportunities. The offices maintain files of current mineral claim maps, air photos, geological maps and reports, and assessment work submissions for their respective districts. The Uranium City office was closed on September 15th, 1983 in response to a much reduced level of exploration in the Athabasca Mining District.

At the end of the fiscal year, the Economic Geology Section was reformatted to a newly named Mineral Development Section.

SEDIMENTARY RESEARCH GEOLOGY

The Section is responsible for geological studies of the sedimentary rock formations in Saskatchewan, with special reference to the petroleum and natural gas fields, petroliferous trends, and areas with potential for new discoveries. By so doing, it is able to provide expert advice on these formations needed by the prospecting industry and departmental staff involved with land evaluation, oil reserve estimation, and data management.

Staff resigned from the Section to work for the petroleum industry. This reduced the Section's staff by 60% and the number of projects to 1 on the Tangleflags heavy oil field in the Lloydminster region, and the other on the biogeochemistry of uranium in northern Saskatchewan. These projects were supplemented by partial support of M.Sc. theses on the heavy oil-bearing strata of the central Lloydminster producing region and the Cretaceous natural gas-bearing sandstones of southwestern Saskatchewan, at the Universities of Regina and Windsor, respectively.

At the end of the fiscal year, the Section was reformatted to the Petroleum Geology Section.

INDUSTRIAL MINERALS SECTION

Work on the peat resource inventory and on the Buffalo Narrows fuel peat demonstration project was brought to a premature termination by budgetary constraints. The fuel peat demonstration project carried out near the community of Buffalo Narrows indicated that the production and utilization of fuel peat for domestic heating are technically feasible. The resource study revealed that much of Saskatchewan peatlands contain peat of fuel grade. The final report of the fuel peat demonstration project was released as Open File report 84-22. A report on the peat resources in the western Saskatchewan peatland belt is in preparation.

Seven technical papers were presented during the fiscal year, including one each for the Canadian Institute on Mining and Metallurgy, the 6th International Industrial Minerals Conference, the First International Potash Technical Conference, and the 7th International Peat Congress.

The section responded to over 125 inquiries mostly from industry, related to a wide variety of industrial minerals. Peat resources ranked first in terms of interest and accounted for 20% of the inquiries, followed by lignite, potash, and clay.

GEODATA SECTION

Sedimentary Geology Unit

During the fiscal year, 663 new well records were added to the Computerized Well Data System, and over 5160 well records were amended, corrected, and updated by coding supplementary and corrected information.

A total of 2186 new well files were established. Geological formation tops of 862 wells were picked and 750 new wells were coded for entry into the computerized system.

Well data supplied to industry and the department staff were as follows: Clerical staff pulled and refiled the records of 23 526 wells; 4654 for department staff and 18 872 for industry. The staff also provided 47 509 pages of photocopied data to industry. Additionally, 8217 submissions of technical data were received.

Geophysics Unit

During the year, 56 licenses were issued as well as Crew Certificates for geophysical exploration work, mostly seismic in southern Saskatchewan.

Technical studies underway were:

1. A 6-part interpretive geophysical map of the sedimentary basin of Saskatchewan. The map for the Kindersley area was completed.
2. Updating of the seismic structure contour map of southeastern Saskatchewan from newly declassified data.
3. Geophysical data index maps covering the southern half of the province. The maps are in 2 sets of 6 maps each.

Precambrian Geology Unit

The unit is responsible for the maintenance and update of the following computerized files:

Mineral deposits index file

Precambrian original data file

Precambrian resource file

Precambrian sample index file

Precambrian geochemical file

File management is handled by a stand alone mini computer system and the main frame of Sask Comp. Systems were developed to:

1. catalogue Precambrian rock samples and to facilitate the work of sample storage and retrieval
2. enable search of the Saskatchewan mineral records by mineral suites, NTS area, or any combination thereof
3. plot from the data files on the basis of Latitute-Longitude or Universal Transverse Mercator Coordinates

Work on the Saskatchewan Mineral Deposit Index included verification and correction of computer-plotted index maps, and the addition of 44 newly documented mineral showings to the data file. Updated documents of 555 new mineral showings were supplied to district offices and to the National Mineral Inventory. Some 36 requests for the index were handled.

A total of 252 assessment files submitted under the Mineral Deposition Regulations were processed, 108 visitors were received, and 31 requests for information by mail and 84 by telephone were handled. Industry requests resulted in 3479 copies of maps, 14 583 pages and other compilations of information being sent out. During the year, 780 assessment submissions occupying 25 m of shelf space were catalogued and readied for processing.

SUBSURFACE GEOLOGICAL LABORATORY UNIT

During the year 1983/84, the laboratory recorded the following activities:

New core received: 8404 boxes from 522 wells

Core now in storage: 230 898 boxes

Drill cutting samples washed, catalogued, and stored: 17 110 vials

Drill cutting samples washed and catalogued for shipment to the Department of Energy, Mines and Resources, Calgary: 13 443 vials. Actual samples shipped: 11 379 vials

Number of Industry users of the Laboratory: 164 from 97 firms

Cores examined: 49 436 boxes from 3186 wells

Samples examined: 361 wells

Temporary transfers of cores to outside the Province: 36 wells

Thin Sections prepared for staff: 1194

The general public, in particular elementary school teachers and their earth science classes, continued to show interest in laboratory building tours. Several such tours, finishing with a brief talk and question period, were conducted during the year. The core examination facilities were also utilized by University students in conjunction with geological course work and theses.

MINERAL RESOURCES DIVISION
MANITOBA DEPARTMENT OF ENERGY AND MINES

The Mineral Resources Division's Annual Meeting with Industry was held at the International Inn (Winnipeg) on November 16, 1983, with 194 delegates from industry, other government agencies, and universities in attendance. The Annual Report of Field Activities and 12 preliminary maps were released at the meeting, along with oral presentations and displays assembled by Provincial, Federal, and University geoscientists engaged in programming which in large part was funded under the Federal/Provincial Interim Mineral Agreement (1983-85).

With the coming of spring, the Geological Services Branch moved from its old location on Century Street to join the rest of the Department at Eaton Place in downtown Winnipeg. The new address is as follows:

Manitoba Geological Services Branch
Department of Energy and Mines
Eaton Place
555-330 Graham Avenue
Winnipeg, Manitoba
R3C 4E3

In April 1984, Manitoba was the first Province to join with the Federal Government in signing a new 5-year Agreement under E.R.D.A. to assist mineral exploration and development in areas of common concern. Under the terms of the Canada-Manitoba Mineral Development Agreement (MDA), Canada and Manitoba will spend, over the next 5 years, a total of $24.7 million to implement geological, geochemical, and geophysical surveys, research into mining technology development, marketing, and other mineral economic studies in order to improve the level and effectiveness of mineral exploration, and to investigate potential new developments that could lead to a diversification of the mineral base currently exploited in the Province.

The 1984/85 Workplan for Sector "A" Geoscientific Activities identified a total of 46 Provincial projects, and 19 projects to be implemented by the Geological Survey of Canada. Contributions by the

Geological Survey of Canada (under a new concept of parallel delivery) are intended to complement programs mounted by their provincial counterparts and will be restricted to projects in which the Geological Survey of Canada has a unique technical or technological expertise. An integral part of the programming will also include Applied Geoscience Research contributions from universities. This year, projects were initiated with the Universities of Manitoba, Waterloo, Windsor, and Kansas.

In the first year of the new agreement, heavy emphasis has been placed on assisting the search for new ore deposits in the Lynn Lake and Flin Flon regions and on raising the level of exploration elsewhere in the Province. The Provincial Geological Services Branch mounted a broad range of projects investigating the base-and precious-metal potential of the Lynn Lake region. Mineral deposit documentation ranged from the LAR deposit on Laurie Lake to gold occurrences on Cartwright Lake. The Agassiz metallotect was the subject of lithogeochemical, biogeochemical, and basal till studies, and can now be traced from Lynn Lake to east of Barrington Lake for a total distance of 60 km. Detailed work in the area of the Fox Mine has brought to light the structural controls delimiting the extent of the orebody, and these together with a much enhanced stratigraphic and geochemical definition of the mine lithologies will play a key role in guiding the search for other copper-zinc deposits in the mine area. Several reports on the geology of the region are now close to completion as are 1:250 000 scale synoptic compilations. The long-outstanding need for more isotopic data is being addressed through U-Pb zircon programs initiated with the Geological Survey of Canada and University of Kansas as well as continued Rb-Sr work by the University of Manitoba.

In the Flin Flon region, geological mapping of the Kisseynew metallotect demonstrated considerable along-strike extensions to the gold-bearing formation on Nokomis Lake, as well as the equivalency of this zone to that currently being investigated on Puffy Lake. Documentation of gold and base-metal deposits progressed both within the "greenstone" terrain and on the northern flank at File Lake, and led to the inference that the Kisseynew metallotect might have regional extent incorporating the rocks hosting gold mineralization on Squall Lake. Detailed 1:20 000 geological mapping will in future years be focussed on the Athapapuskow and Reed Lake regions, as well as extensions into the Wabishkok region north of those sheets already mapped at Flin Flon and White Lake.

Scout drilling of magnetic anomalies south of Cranberry Lakes extended a program initiated in 1982 south of Reed and Wekusko Lakes, and will eventually provide much needed information on the basement that will be used to compile 1:250 000 scale synoptic interpretations of the Precambrian geology lying beneath the Paleozoic cover rocks. Several of the holes drilled this year were cased to basement and used by the Geological Survey of Canada to test borehole induced polarization, gamma-ray, and susceptibility probes.

Magnetic susceptibility measurements were made by the University of Manitoba on a number of diagnostic formations in the Shield immediately north of the Paleozoic limestones to provide yet another control on the assembly of information from the subsurface.

Elsewhere in the Province, the Branch's Schmidt 300 drill was used successfully to obtain critical information on Paleozoic sequences as part of the Industrial Minerals and Stratigraphic drilling program. Additional holes drilled this year in the Paleozoic sequences provided information needed to ground-truth a seismic profile in Devonian reef structures at Dawson Bay, and for correlation of Ordovician stratigraphy in the Cormorant Lake region, as well as the Silurian near Narcisse. Stratigraphic mapping of shoreline exposures on northern Cormorant and Rocky Lakes encountered buff to red dolomites of the Stony River Formation, whereas at Yawningstone, Mitchell, Ochunipe, and Goose Lakes a similar dolomite has been assigned to the lower part of the Red River Formation. Lake sediment and bottom-water samples were taken on several lakes in the region as part of a pilot study to evaluate the usefulness of this technique as an exploration tool in highly buffered alkaline waters entrapped within limestone sequences.

Mapping north of last year's work at Cross Lake, identified layered mafic-ultramafic intrusions on the northeastern arm of the lake, as well as previously unrecorded occurrences of fragmental felsic volcanic rocks. Geochemical sampling of granitic and pegmatitic bodies in the region was concluded, and detailed sampling and a magnetic survey initiated as part of an evaluation into titanium- and vanadium-bearing anorthositic gabbros south of Pipestone Lake.

Detailed mapping was initiated on Bigstone Lake where volcanic units and associated siliceous iron formation appear to have good potential for associated mineralization. On Island Lake, mapping encountered extensive carbonatization near Loonfoot Island and confirmed the existence of a pronounced break between the Island Lake Group and underlying locally gold-bearing formations of the Hayes River Group. A brief examination of rare-element-enriched pegmatites in the northwest Superior Province was extended this year by the University of Manitoba to include examination of the bodies on Red Sucker Lake.

A brief reconnaissance in the Horseshoe Lake area focussed primarily on the southern limb of the volcanic rocks and recorded siliceous and ferruginous sediments associated with pillowed flows in the vicinity of an INPUT anomaly. Little work has been done in this region and further investigations to evaluate the potential for gold associated with chemical sediments may be warranted in the future.

Mineral investigations in southeast Manitoba centred in the area east of Bissett and resulted in detailed documentation, sampling, and mapping of iron formations and associated metallotects north of Wallace and Beresford Lakes. Gold occurrences elsewhere in this region were documented and sampled in detail to investigate possible extensions to known mineralized zones, as well as geologically favourable units that might contain significant background gold.

Repeated attempts to locate chromite occurrences north of Maskwa Lake failed to encounter deposits of any consequence; moreover, the association of intrusive and extrusive, possibly comagmatic, anorthosite gabbros and glomeroporphyritic pillowed flows in this region differs markedly from the much more ultramafic association of the Bird River Sill itself. On the Bird River Sill, the platinum metals investigation completed a slice across the lowermost megadendritic and layered section of the sill and provided additional samples that are also being subjected to major and trace element analysis by N.A.S.A. geologists as part of a co-operative program in this area.

Industrial minerals programming continued to engage in evaluation of a broad range of potentially exploitable commodities including silica sand, building stone, soapstone, and chromite. Additional silica samples were collected from the Swan River Formation and the Beausejour area, and newly identified beds of glauconite in the Swan River area mapped and evaluated for extent. A brief reconnaissance of the Flin Flon region was undertaken to investigate reported occurrences of garnet, sillimanite, and other industrial minerals that might have developed potential and lead to a diversification of the mineral base in this area.

Remote sensing studies conducted in collaboration with the Manitoba Remote Sensing Centre continued evaluation of satellite imagery in The Pas region as a means of identifying new deposits of sphagnum peat as well as providing a tool to conduct a dependable, systematic, and inexpensive province-wide peat inventory. The Canada Centre for Remote Sensing has scheduled a low level airborne imagery program for the Lynn Lake region as a preliminary test for spectral analysis of stressed vegetation that might serve as an indicator to buried mineralization.

Field demonstrations were held once again at the outset of the mapping season in the Flin Flon, Thompson, and Lynn Lake regions in order to facilitate co-ordination and co-operative programming with Geological Survey of Canada and University personnel under the Canada-Manitoba Mineral Development Agreement, and for the benefit of company geologists in the respective mining districts.

The Exploration Services Section of the Mines Branch is actively engaged in monitoring and supervising the construction of a new core shed at The Pas. In Winnipeg, existing core storage and research facilities at the University of Manitoba and 1521 Brady Road are being expanded and upgraded to house and process samples from all sectors of the mineral industry.

Gradiometer surveys mounted in the Lynn Lake area during 1982 and 1983 were extended this year by the Geological Survey of Canada to provide complete coverage for the "greenstone" terrain from the Saskatchewan border to east of the Ruttan Mine and the Churchill River diversion. Regional lake sediment geochemical surveys, also contracted through the Geological Survey of Canada, this year were extended to encompass NTS sheets 64 F, 64 G, and 64 B, thereby completing sampling at a density of 1 per 13 km^2 for the entire block including NTS sheet 63 C, sampled in 1983. Geological Survey of Canada activities in northern Manitoba also entailed mapping surficial deposits in the Lynn

Lake area, mineral deposit studies of selected gold occurrences in the Flin Flon region, mineralogical studies of alteration zones in the southeastern Churchill Province, as well as crustal and metamorphic studies focussed in the Kisseynew region and adjacent to the Fox Mine. U-Pb isotope studies of zircons from the Lynn Lake, Flin Flon, and Pikwitonei regions continued this year as did analytical work related to the evaluation of chromite in southeast Manitoba. Several Applied Gesocience Research Agreements were established between the Geological Survey of Canada and Universities in this Province and elsewhere in Canada.

ONTARIO MINISTRY OF NATURAL RESOURCES, MINERAL RESOURCES GROUP

ONTARIO GEOLOGICAL SURVEY

During 1983/84, the Ontario Geological Survey (O.G.S.) carried out a large number of independent geological, geophysical, geochemical, geochronological, and mineral deposit studies. In addition, studies were undertaken in cooperation with the ministry's regional geological staff, personnel from a number of universities, and several private consulting firms.

Funding for a number of regional stimulation projects was provided by the Ontario Ministry of Northern Affairs (M.N.A.), the Government of Canada, and the Ontario Ministry of Natural Resources (M.N.R.), and for the Hydrocarbon Energy Resources Program (HERP) by the Ontario Ministry of Treasury and Economics under the Board of Industrial Leadership and Development (BILD) Program.

The Ministry carried out 62 field projects in various parts of the province and supported 23 applied research projects by Ontario universities as well as 22 exploration technology development projects by the private sector of Ontario's mineral industry. Program highlights are detailed below.

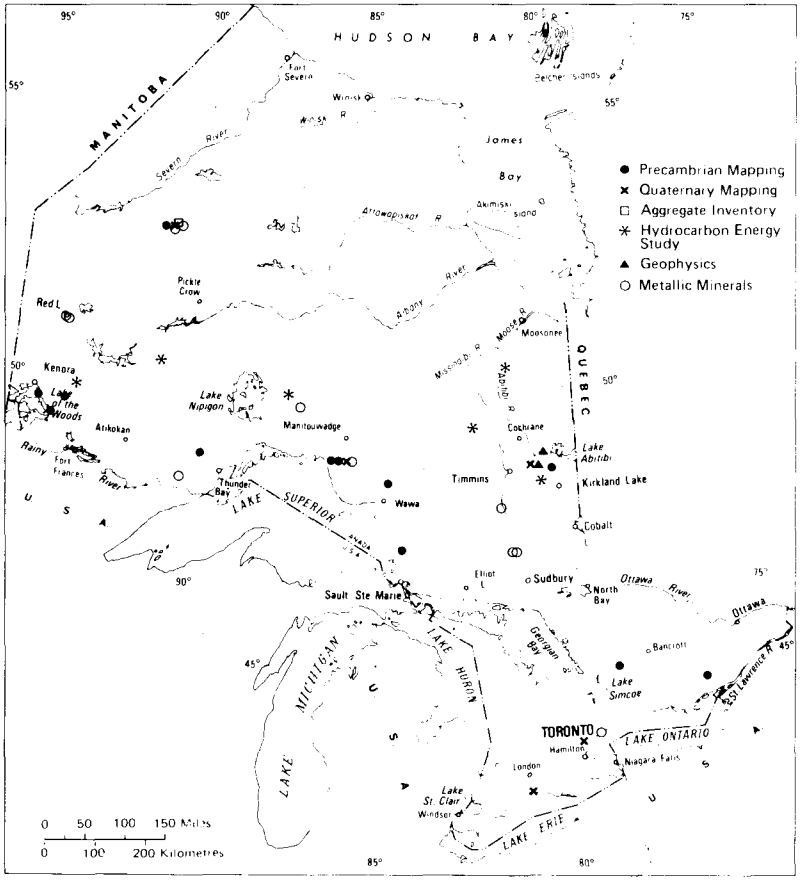


Figure 1 Distribution and type of programs in Ontario.

PRECAMBRIAN GEOLOGY

Staff of the Precambrian Section took part in 19 geological mapping projects and special studies; 9 involved detailed areal mapping (1:15 840), 1 regional reconnaissance survey, 3 surveys designed to solve specific geological problems, and 6 regional tectonostratigraphic syntheses projects.

A program to identify supracrustal stratigraphy in regions of high metamorphic grade was initiated in the English River Subprovince. Identification of nappe-like structures provides new insight into the tectonic history of this area.

A special study in the Dryden area established lithogeochemical criteria for locating rare-metal pegmatite based upon chemical and mineralogical zonation documented by this investigation.

In the Hemlo area, detailed geological mapping continued to the east of Hemlo and a study to identify host lithologies and to assess lithological and structural controls on the mineralization was begun.

Projects in Lakehead-Atikokan, Kirkland Lake-Larder Lake, and other areas integrated geological information where significant new data are available. New stratigraphic and tectonic syntheses will be based on these compilations in preparation for work on a revised geological map of Ontario.

ENGINEERING AND TERRAIN GEOLOGY

In 1983/84, the Engineering and Terrain Geology Section completed the regional mapping of the Quaternary geology of the Algonquin Park and the Port Burwell areas in southern Ontario, and of the Paleozoic rocks in the Arnprior and the Lake Timiskaming areas.

Peatland inventories continued in both northern and southern Ontario as did the preparation of aggregate resources inventories. The inventory of Ontario oil shales continued through an extended drilling and sampling program in southwestern Ontario.

Other projects involved a joint Quaternary geology/geochemistry orientation study of the Hemlo gold camp in north-central Ontario, and Quaternary geology staff participated in several mineral exploration workshops demonstrating the value of surficial geological studies in the search for mineral deposits in drift-covered terrain.

The program of 1:50 000 scale mapping of the Paleozoic geology of the province continued in 1983/84 with the completion of the mapping of areas underlain by Ordovician strata in the Ottawa-St. Lawrence Lowland. Particular attention was given to the Arnprior area, northwest of Ottawa. Some 11 new preliminary geological maps covering the Lowland are scheduled to be published in 1984.

Paleozoic geology staff also completed the Manitoulin Island Limestone-Dolostone Assessment Project, carried out with funding from the Ontario Ministry of Northern Affairs, which has resulted in the establishment of a major new dolostone quarry on the island.

Aggregate Resources Inventory staff conducted assessment of sand and gravel potential in several Southern Ontario townships and in the Sault Ste. Marie, Espanola, and Hemlo areas of Northern Ontario.

The third year of a 5-year Hydrocarbon Energy Resources Program (H.E.R.P.) (funded by the Ontario Board of Industrial Leadership and Development (BILD)) commenced in 1983/84. The program will provide an assessment of the peat, lignite, oil shale, and conventional oil and gas resources of the province. Peatland inventories were conducted in 7 areas (Rainy River, Ignace, Foleyet, New Liskeard, Parry Sound, Belleville-Kingston, and Ottawa-Brockville). The Oil Shale Assessment Project, an integrated program of drilling, analyses, and applied research, includes hydrocarbon analyses of core; mineralogy, organic geochemistry, and physical properties of the Kettle Point Formation, and trilobite and conodont biostratigraphy of the Upper Ordovician Collingwood Member.

The drilling phase of the Lignite Assessment Project was completed during the winter of 1984 and will result in a major refinement of the known distribution of lignite-bearing Mesozoic sediments in the Moose River Basin. One borehole was drilled to a depth of 625 m in the Schlievert Lakes area and provides an almost complete record of the Phanerozoic succession in the Moose River Basin.

The conventional oil and gas component of the Program involved the evaluation of 25 oil and gas deposits in Devonian and Silurian units of southwestern Ontario and beneath Lake Erie.

MINERAL DEPOSITS

Studies of the geology of gold continued to be the focus of activities by the Mineral Deposits Section in 1983/84. This program has, through symposia and publications, elicited considerable response from exploration geologists, and has had direct influence on staking and exploration programs. Studies included gold associated alteration in Red Lake, gold with Abitibi Belt felsic intrusions, gold iron formation association, potential Huronian paleoplacer gold, and the development of a computer-processable file of Abitibi Belt gold deposits.

New program components in 1983/84, include U-Pb zircon age dating in the Abitibi Greenstone Belt to provide absolute time constraints for volcanic and stratigraphic evolution and gold mineralization, and structural studies in the Beardmore-Geraldton Belt to determine the relationship of major tectonic zones to gold mineralization.

Studies of the metallogenesis of the Fort Frances-Mine Centre area, radioactive minerals in the Kirkland Lake area, silver-cobalt mineralization of the Cobalt area, and base-metal, molybdenum, talc, and gold resources in the Grenville were completed in 1983/84.

GEOPHYSICS/GEOCHEMISTRY

Survey activity and experimentation continued on the Night Hawk geophysical test range near Timmins. Gravity data interpretation over the Sudbury Structure was completed and the development and data acquisition stages of a contract to test-fly a commercial aeromagnetic gradiometer was completed by Kenting Earth Sciences Limited of Ottawa.

A geochemical lake sediment sampling survey was completed in the Batchawana area and a basal till geochemistry report of the Kirkland Lake area, a joint study by the Geochemistry and Quaternary Geology Sections to investigate the overburden characteristics of gold and associated pathfinder elements in the Hemlo area was concluded. Radiometric age determinations were carried out in the Batchawana, Madsen, and Kenora areas.

REGIONAL AND RESIDENT GEOLOGISTS

Fourteen Regional and Resident Geologist offices provide a strong, active technical consultative service across the Province. Staff of these offices provide information on the geology and mineral deposits of Ontario to the mining and exploration industry and input into the Province's resource management planning system.

Each office maintains a library of published and unpublished reports, exploration reports submitted for assessment work credit, and selected scientific journals.

Resident Geologists and their staff participated in several inventories and scientific investigations including a building stone inventory of northwestern Ontario; inventories of industrial mineral deposits in central and eastern Ontario; gold deposits studies in the Red Lake area; potential placer-type gold in Huronian rocks, and hydrocarbon energy resources in southwestern Ontario.

Five core storage facilities have been completed in Kirkland Lake, Timmins, Sault Ste. Marie, Bancroft, and Tweed. The Kirkland Lake and Timmins facilities will house 600 000 feet, the Sault Ste. Marie facility 450 000 feet, and the Bancroft and Tweed facilities will have a capacity of 150 000 feet. A core librarian in each facility will computerize the core data for indexing, data storage, and easy retrieval and will aid the public. Future core storage facilities are planned in Thunder Bay, Sudbury, and Kenora. This Program is sponsored by the Ontario Government's Board of Industrial Leadership and Development (BILD).

GEOSERVICES SECTION

Compilation and computerization of mineral deposit data by the Geoscience Data Centre continued. Mineral Deposit Inventory files total 5500 including 1000 on gold. Mineral Resources Group publications and exploration assessment work reports were indexed and added to both the in-house database and the national GEOSCAN bibliographic file, which now totals 15 200 Ontario Geological Survey entries. File, index, and microfilm systems to improve accessibility to exploration reports have been completed for the Sault Ste. Marie and Sudbury Resident Geologists' offices.

A new public data retrieval service was introduced in January 1984. On request, chemical data on 9600 rock specimens are selectively retrieved from the in-house PETROCH database. PETROCH will be continuously expanded as branch geologists complete further rock studies.

Three indexes to geoscience data were published: Index to Publications by the Mineral Resources Group, 1981 to 1983; the microfiche Index to Data in Exploration Reports, and the General Index to Published Reports, 1966-1975.

The Scientific Review Office has initiated a "Demand Publishing" system based on laser printing, computerized typesetting and page layout, and computerized graphics for illustrations and maps. Benefits expected are reduced production costs, demand printing of publications, and computerization of map production.

The Mines Library provides an information and reference service to Ministry personnel and the mining industry on the geology of Ontario and its mineral deposits. During 1983/84, the Library responded to approximately 8500 requests for information.

GEOSCIENCE RESEARCH AND DEVELOPMENT

In 1983/84, the Ontario Geoscience Research Grants Program awarded 23 grants totalling $500,000 to 9 Ontario universities. The grants finance mission-oriented research in Ontario which is closely integrated with, but does not duplicate the activities of the Ontario Geological Survey.

The Exploration Technology Development Program supports joint ventures with Ontario companies, offering research and development capabilities leading to the development of innovative technology, specifically in those areas which support the mineral exploration industry. This Program is sponsored by the Ontario Government's Board of Industrial Leadership and Development (BILD). In total, the 1983/84 program supported 22 projects by 20 Ontario companies, with expenditures totalling $894,267.

Reports by OGRF and ETDF recipients were presented at the annual Ontario Geological Survey Geoscience Research Seminar on December 6 and 7, 1983.

DIRECTION GENERALE DE L'EXPLORATION GEOLOGIQUE ET MINERALE

MINISTERE DE L'ENERGIE ET DES RESSOURCES, GOUVERNEMENT DU QUEBEC

SECTEUR "MINES' DU QUEBEC

L'année 1984/85 fut encore une période de remise en question et de restructuration. En 1983/84, le secteur "Mines" a redéfini son mandat comme celui de promouvoir le développement de l'industrie minérale du Québec. Suite à cette redéfinition, la structure organisationnelle et les moyens d'intervention furent révisés en profondeur. Le but de la restructuration était de ne conserver que les activités essentielles pour atteindre les objectifs identifiés comme prioritaires dans ce nouveau mandat. Un des moyens privilégiés d'intervention est de favoriser la politique du "faire-faire", pour favoriser le développement de l'infrastructure de notre industrie minérale.

Les objectifs du secteur se subdivisent en deux grands groupes:

A ceux qui favorisent la cueillette et le traitement de l'information en vue de proumouvoir l'exploration minière et les découvertes minérales;

B ceux qui favorisent l'exploitation et le développement de nos ressources minérales en vue de promouvoir l'exploitation minière.

Le but premier de ce résumé est de présenter les activités orientées vers des objectifs de type A. Quelques programmes d'assistance présentement en vigueur et orientés vers des activités de type B sont aussi soulignés.

A — Premier groupe d'objectifs

Deux entités administratives travaillent sur le premier groupe d'objectifs. La première est la Direction Générale de l'Exploration Géologique et Minérale (DGEGM) et la deuxième est la Direction de l'Analyse et du Contrôle (DAC) du Centre de Recherches Minérales (CRM). Cette dernière fournit à la DGEGM les données géochimiques et minéralogiques qu'uelle requiert.

LA DIRECTION GENERALE DE L'EXPLORATION GEOLOGIQUE ET MINERALE

L'année financière 1984/85 fut marquée encore une fois par un haut niveau d'activités en acquisition de connaissances géologiques. Ce niveau d'activités résulte en grande partie d'efforts substantiels fournis dans le cadre des plans quinquennaux de la Fosse du Laborador et de la Gaspésie.

Ainsi, la DGEGM a consacré 10,9 M$ au volet "acquisition de connaissances" dont la majorité de cet argent est imputé aux frais directement reliés aux opérations de terrain dans les différentes régions du Québec. Un montant 7,7 M$ fut consacré à des programmes de subventions et d'aide à l'exploration et à la synthèse de la géoinformation.

En novembre 1983, un budget additionnel de 4 M$ a été accordé à la DGEGM pour l'acquisition de connaissances. Cet argent a servi à accélérer la couverture de certains territoires à l'aide de techniques géophysiques et géochimiques.

ETUDES GEOLOGIQUES

Sud du Québec

La région de la Gaspésie fait présentement l'objet d'un plan quinquennal. La programmation de 1984/85 pour cette région contenait 17 projets dont 16 de terrain. Le budget total affecté à ces activités était de 1 447 000 $. Les projets sont de quatre types. Le premier comprend les études de cartographie, stratigraphie et tectonique en milieu sédimentaire (10 projets). Le deuxième comprend des études relationnelles et génitiques des différents corps volcaniques (2 projets) tandis que le troisième comprend trois études de nature métallogénique (Les Mines Gaspé, Le Dôme de Lemieux et Sullipek). Le quatrième comprend deux études de quarternaire ayant pour but d'obtenir une meilleure compréhension des mécanismes glaciaires que ont dispersé les erratiques et micro-erratiques. Notons dernièrement qu'environ la moitié des projets de 1984/85 étaient dans leur dernière année de réalisation.

Sept (7) projets de terrain ont été effectués dans la région de l'Estrie et des Basses-Terres du St-Laurent. Leur but était de mettre en valeur le potentiel minéral de ces secteurs. Le total des argents affectés à ces projets est de 583 000 $. Les projets se divisaient en deux types: les études à caractère essentiellement gîtologique (4 projets) et les travaux de nature géologique (3 projets). Ces derniers par contre furent effectués dans des régions minéralisées et visaient à augmenter notre connaissance de base dans des zones à fort potentiel.

L'Ouest de Québec

L'activité géologique se situe surtout dans le Nord-Ouest québécois. Elle s'est concentrée dans les formations volcaniques et volcano-sédimentaires de la province du Supérieur. L'activité du Ministère se répartit en deux zones de caractère géologique différent, la zone de Chibougamau - Desmaraisville-Matagami au nord et la zone de Val-d'Or — Rouyn-Noranda au sud.

Tous les travaux avaient la même finalité: définer les aires à l'intérieur desquelles les probabilités de minéralisation (Ag, Cu-Au, Zn-Ag-Au, Cu-Zn) sont les plus élevées. Le moyen principal utilisé fut la cartographie géologique. Par contre, certains projets étaient effectués en fonction de la métallogénie ou en prévision de compilations ou synthèses.

Au total, 1 226 000 $ furent répartis entre 11 projets. Notons que plus de 63% des dépenses furent imputés aux travaux de cartographie sous contrat. Ceci reflète fort bien l'orientation actuelle du ministère vers la politique du "faire-faire". Avec l'avancement des travaux dans cette région, la part du budget imputé aux études gîtologiques et métallogéniques va probablement augmenter dans les prochaines années.

Nord-Est du Québec

La partie est de la province de Grenville couvre un vaste territoire où la géologie est assez peu connue. Une somme de 141 000 $ y a été allouée, répartie sur 3 projets. Deux de ces projets visaient la cartographie détaillée de régions à fort potentiel. Le troisième était une étude gîtologique ayant pour but d'augmenter notre connaissance sur les minéralisations (Au, Cu-Ag, Zn-Pb) de la région de Sacré-Coeur et de Grandes-Bergeronnes.

Les travaux effectués dans le Churchill c'est-à-dire dans les Fosses du Labrador et l'Ungava et leur arrière-pays ont deux buts:

a améliorer la connaissance de base acquise sur de grands territoires à l'aide de levés géologiques régionaux;

b approfondir la connaissance sur des territoires à fort potentiel à l'aide de levés ponctuels.

Cette année, un budget de 581 000 $ été affecté à la Fosse de l'Ungava (4 projets). Les travaux avaient pour but de faire la synthèse de la moitié ouest de la Bande de Cap Smith-Maricourt à l'aide de levés de reconnaissance géologique systématique à l'échelle de 1:50 000. Des levés ponctuels portant sur la métallogénie, la tectonique, le métamorphisme et la géochimie des roches ont aussi été effectués. Ce programme fait partie du plan quinquennal de la Fosse de l'Ungava, lequel a débuté en 1983 et se terminera en 1988.

Etant donné que la cartographie systématique de la Fosse du Labrador à l'échelle 1:50 000 est complétée, nos travaux ont maintenant des objectifs plus spécifiques de nature métallogénique. Par contre, vu que notre connaissance de l'arrière-pays à l'est de la Fosse du Labrador est très limitée, nous avons mis sur pied un programme de cartographie systématique à l'échelle 1:50 000. Les efforts ont commencé dans les régions à plus fort potentiel. Les argents affectés aux travaux dans la Fosse du Labrador et son arrière-pays furent de 1 088 000 $ répartis entre 13 projets qui s'intègrent au plan quinquennal.

Minéraux industriels

La Division des minéraux industriels a effectué des travaux d'inventaire dans les régions de l'Outaouais, du Sud et du Nord-Ouest du Québec. Une somme de 265 000 $ a été affectée à ces travaux.

Dans la région de l'Outaouais, le Ministère a cartographié en détail certains gîtes et indices de graphite afin d'évaluer leur potentiel. Un deuxième projet avait pour but l'inventaire et l'évaluation préliminaire de dépôts ou d'indices de diopside et de wollastonite.

Dans le Sud du Québec, nous avons effectué la première phase d'un inventaire des dépôts de talc et stéatite de la ceinture ophiolitique des Cantons de l'Est; nous avons également élaboré une méthode d'inventaire des ressources en granulats.

Dans le Nord-Ouest, l'inventaire des tourbières s'est poursuivi dans la région de Senneterre-Barraute. Le projet permettra de définir le potentiel en tourbe d'un territoire couvrant plus de 13 500 km^2. Finalement, on a travaillé à définir le potentiel en pierre de taille des massifs ignés de la région de Chibougamau.

GEOCHIMIE ET GEOPHYSIQUE

L'année 1984/85, tout comme l'année 1983/84, fut une année exceptionnelle tant du côté de la géochimie que de la géophysique. Cette activité a été causée par l'injection d'un budget supplémentaire de plus de 4 M$ en octobre 1984.

Pour la première fois, de nombreux travaux d'échantillonnage géochimique furent effectués en hiver. Un levé de sédiments de lac (3000 sites) a été effectué dans la Fosse du Labrador en même temps qu'un levé gravimétrique. Un programme de géochimie des eaux souterraines (16 000 sites) a été effectué dans le Sud du Québec. Finalement, un programme multi-levés en géochimie a été lancé dans la région du Thetford. Des sols, tills et eaux souterraines ont été prélevés systématiquement sur un territoire de 4000 km^2. Durant l'été 1984, un nouveau programme de sédiments de lac (7000 sites) fut effectué dans la partie nord de la Fosse du Labrador. La somme affectée à ce projet fut de 350 000 $. Compte tenu du nombre considérable d'échantillons (67 000) prélevés durant la période de juin 83 à août 84, il fut nécessaire d'investir environ 1 M$ pour faire effectuer à contrat sous la responsabilité du CRM, une partie de l'analyse de ces échantillons.

Le budget additionnel de 4 M$ a aussi permis d'effectuer un levé aéromagnétique de type gradiométrique dans la région de Matagami et six projets de nature électromagnétique (INPUT et REXHEM). Deux de ces derniers accélèrent la couverture électromagnétique de l'Abitibi tandis que deux autres débutent celle de la Fosse du Labrador. Les deux derniers furent effectués sur la Côte-Nord et dans l'Estrie. L'ensemble du budget réservé pour la géophysique en 1984/85 (1 615 000 $) a aussi été affecté à ces travaux et aucun nouveau projet ne fut lancé.

Depuis de nombreuses années, le Québec effectue l'inventaire de grandes parties de territoire avec des approches géochimiques et géophysiques. Dans les années qui viennent, nous favoriserons le développement de l'industrie en accentuant davantage l'interprétation des données.

PROGRAMME D'ASSISTANCE FINANCIERE

Le MER a mis sur pied en mai 1984, un programme d'assistance financière à l'exploration minière. Ce programme vise à encourager l'exploration minière soit dans certaines régions (Gaspésie, Fosse du Labrador) soit pour certaines substances (cuivre et zinc en Abitibi) qui ne sont pas favorisées par la conjoncture actuelle. Une subvention est accordée à certains types de travaux additionnels effectués par les compagnies.

Le principal type de travail subventionné est le forage. Le pourcentage de subvention varie de 35% en Abitibi à 50% en Gaspésie et jusqu'à 90% dans la Fosse du Labrador.

Un budget d'environ 3 M$ a été mis à la disposition du programme pour l'exercice financier 1984/85. L'opportunité d'étendre la portée de ce programme de subventions à d'autres régions ou à d'autres types de travaux (ex.: R&D) est actuellement à l'étude.

GEOINFORMATION

La banque de données bibliographiques en accès direct, nommée EXAMINE, est maintenant à la disposition du public pour le repérage et le signalement de l'information de nature géoscientifique couvrant l'ensemble du territoire du Québec. L'implantation d'EXAMINE dans les cinq bureaux des représentants régionaux (Chibougamau, Rouyn, Sainte-Anne-des-Monts, Sept-Iles et Val-d'Or) est prévue pour l'automne 1984.

Plusieurs autres réalisations importantes ont été effectuées en 1984/85 dans le domaine de l'information géoscientifique. Premièrement, un guide de la géoinformation québécoise sera publié sous peu. Deuxièmement, la nouvelle carte géologique du Québec, la carte minière du Québec et la mise à jour de l'inventaire des gisements minéraux et de la production minérale du Québec paraîtront au début de 1985. Troisièmement, la compilation géologique à l'échelle 1:250 000 accompagnant les cartes de gîtes minéraux se poursuit. Les cartes de la région de la Côte-Nord ont été publiées en 1984. Suivront celles de la région de la Fosse du Labrador (1985).

Enfin, nous avons collaboré cette année avec le USGS et les provinces maritimes à la réalisation de la carte métallogénique des Appalaches à l'échelle 1:1 000 000.

ASSISTANCE AUX REGIONS MINIERES

Le service de l'Assistance aux régions minières a succédé au service des Géologues résidents. Il continue cependant à desservir les mêmes districts, soit Rouyn-Noranda, Val-d'Or, Chibougamau, Sept-Iles, Sainte-Anne-des-Monts et le Sud du Québec.

Cette réorganisation vise à:

- permettre une représentation plus globale du secteur "Mines" en région;
- offrir à la clientèle minière une gamme de services plus étendus;
- fournir un accès plus rapide et plus efficace à l'information géoscientifique et à l'information relative aux titres miniers;
- utiliser les ressources humaines de façon plus rationnelle.

Pour atteindre ces objectifs, le service d'Assistance aux régions minières s'est vu confier un nouveau mandat qui peut se résumer de la façon suivante:

"maintenir en région une représentation qui renseignera l'industrie minérale sur les divers programmes d'aide financière et technique offerts par le secteur "Mines", les autres ministères québécois et le gouvernement fédéral; recueillir et transmettre aux services centraux l'information géoscientifique, minière et industrielle requise pour la planification stratégique, technique et légale, nécessaire au développement de l'industrie minérale; tenir des comptoirs où les différents intervenants en exploration minière pourront déposer des documents légaux et obtenir les explications."

LE CENTRE DE RECHERCHES MINERALES

Analyses géochimiques et minéralogiques

Le laboratoire d'analyse du Centre de Recherches Minérales (CRM) existe pour le bénéfice des intervenants du secteur minéral québécois. Il leur fournit des services de recherche et d'analyse spécialisés mettant en oeuvre des techniques aussi bien minéralogiques que chimiques et physico-chimiques.

Son effort principal d'analyse (2/3) est consacré à la Direction Générale de l'Exploration Géologique et Minérale (DGEGM) du ministère de l'Energie et des Ressources. Il lui procure des données analytiques essentielles qui lui permettent d'augmenter la connaissance géologique extensive du territoire québécois. Ces services d'analyse peuvent être évalués à plus d'un (1) million de dollars par année. D'autres travaux d'analyse sont faits pour valoriser certaines cibles auprès de l'industrie minière, pour vérifier la validité de certains résultats ou encore pour comprendre leurs significations.

Environ vingt mille échantillons de minéraux, de roches, de sols, de sédiments et d'eaux souterraines ou de surface sont ainsi acheminés chaque année par la DGEGM au laboratoire du CRM. Ce travail analytique représente plusieurs centaines de milliers de dosages, de déterminations ainsi que d'études minéralogiques et les teneurs des éléments dosés peuvent varier de quelques fractions de partie par milliard (ppb) jusqu'à 50% dans certains cas. Ces exigences requièrent l'utilisation de seize (16) techniques d'analyse différentes et des systèmes automatisés et informatisés hautement performants tels que la spectrométrie d'émission atomique au plasma (ICP), à la spectrométrie des rayons-X et la spectrométrie d'absorption atomique.

Il arrive que les demandes d'analyse de la DGEGM dépassent carrément la capacité normale du laboratoire du CRM. A ces occasions, des contrats d'analyse sont placés à des laboratoires commerciaux. Cette politique du "faire-faire" s'est accentuée au cours des dernières années. Ainsi, au cours de 1983/84 seulement, une somme de 682 701 $ a été accordée en contrats d'analyse à des laboratoires privés. En 1984/85, le montant sera de l'ordre de 250 000 $.

Le laboratoire se propose de développer très prochainement une unité minéralogique dotée des appareils scientifiques les plus sophistiqués. Le but de ce nouveau service sera de fournir des informations scientifiques précises et approfondies relativement à la composition minéralogique, à la texture et à la structure d'échantillons toujours plus complexes à analyser.

B — Deuxième groupe d'objectifs

LA DIRECTION GENERALE DE L'INDUSTRIE MINERALE

Deux entités administratives travaillent sur les objectifs qui favorisent l'exploitation et le développement des ressources minérales. La première est la Direction Générale de l'Industrie Minérale (DGIM) tandis que la deuxième est la Direction de la recherche et du développement du CRM.

Les programmes d'assistance en vigueur à la DGIM sont les suivants:

Le programme d'accélération des investissements privés

L'aide financière possible peut représenter jusqu'à 15% des dépenses en machinerie et équipements et jusqu'à 20% des dépenses en construction, R&D et infrastructures, en autant que la nécessité d'une telle assistance pour accélérer et/ou assurer la réalisation du projet soit démontrée.

Les études technico-économiques

Une assistance visant à stimuler les investissements privés dans le secteur minérale permettant au ministère de l'Energie et des Ressources de prendre en charge le coet des études de marché et de faisabilité technico-économique dans une proportion pouvant aller jusqu'à 75% dans certains cas.

L'embauche de specialistes

Un programme visant à favoriser le développement technologique des entreprises par l'embauche de specialistes en sciences minérales et connexes et en science de l'administration permet au ministère de l'Energie et des Ressources de défrayer 50% du salaire et des avantages sociaux consentis au(x) dipleme(s) au cours de la première année ou 25 000,00 $ par dipleme, selon le moins élevé de ces deux montants.

Les pierres dimensionnelles

Un programme visant à atténuer, dans une certaine mesure, le risque associé à l'ouverture de nouvelles carrières permet au ministère de l'Energie et des Ressources de consentir une aide équivalente a 25% des dépenses de mises en valeur et de développement. De plus, une assistance financière sous forme d'une prise en charge des intérêts sera possible lors de l'achat de machinerie et d'équipements nécessaires à l'exploitation.

LE CENTRE DE RECHERCHES MINERALES

Recherche et développement

La Direction de recherche et développement dispense des services de développement de procédés à l'échelle du laboratoire et à l'échelle de l'usine pilote. Lors des récentes restructurations, deux nouvelles unités ont été formées: un service de technologie minière et un service de commercialisation et contrôle dont le mandat est de mettre en lumière l'assistance que le CRM peut offrir à l'industrie.

Les activites de recherche se déroulent dans une large mesure au niveau du laboratoire. C'est à partir résultats obtenus à cette étape que l'on peut déterminer les caractéristiques particulières de chaque minerai, découvrir la forme de présentation des minéraux et finalement établir des schémas d'opération permettant la récupération des substances minérales recherchées. Cette fonction de recherche et développement ne pourrait se réaliser si elle n'était pas soutenue par des activités d'analyses chimiques, minéralogiques ou physico-chimiques permettant d'identifier les sustances minérales, leur conformation et leur degré de concentration.

Les projets en R/D requièrent environ la moitié du budget annuel du CRM qui est de 8 M$. Ils touchent surtout cinq secteurs spécifiques: les minéraux industriels, les métaux précieux et métaux de base, les minerais de fer et éléments associés et le niobium.

MINERAL RESOURCES DIVISION
NEW BRUNSWICK DEPARTMENT OF NATURAL RESOURCES

Geoscientific and related activities of the Mineral Resources Division in 1983/84 were carried out at levels similar to the previous year. It is estimated that about $1.1 million was spent on these activities in 1983/84. The decline in program spending experienced in the last 2 or 3 years is attributable to the termination of the Canada-New Brunswick Minerals and Fuels Subagreement. It is anticipated that this decline is temporary because a new minerals agreement is expected to be signed in the near future. This new agreement will see provincial geoscience activity levels increase to the average levels attained during the past decade. Under this new agreement, in addition, the Geological Survey of Canada will exhibit a considerable geoscience presence in New Brunswick, a circumstance which will greatly accelerate the accumulation of geoscience data and hopefully stimulate mining developments.

The Division's activities were concentrated in 5 major fields. These include: 1. Geological mapping, 2. Regional silt and till sampling, 3. Gravity surveying, 4. Mineral potential evaluation, and 5. Miscellaneous research.

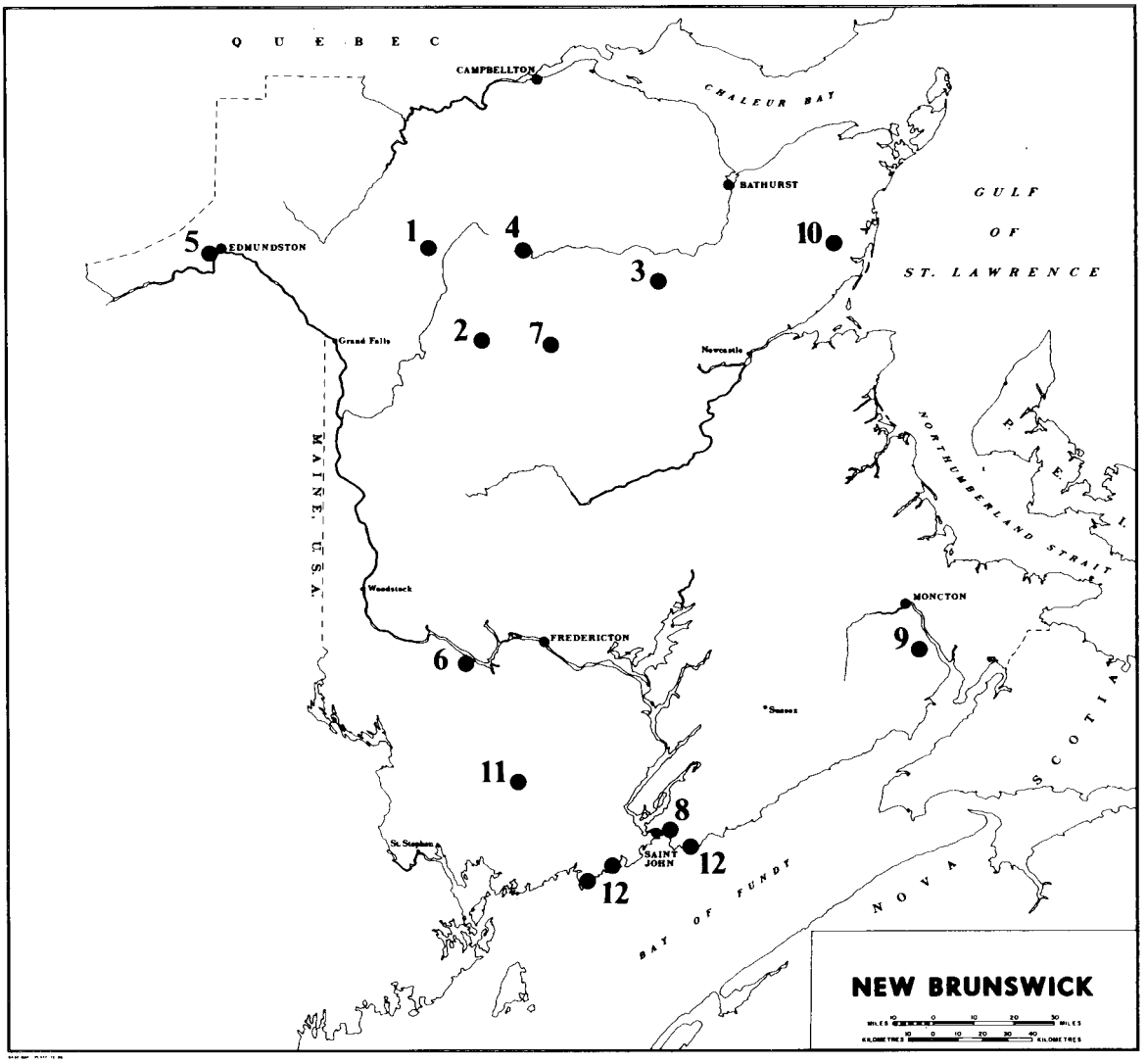


Figure 1 Major Projects — Geological Branch.

GEOLOGICAL MAPPING

Aerial geological mapping was carried out in 3 areas in northern New Brunswick. Bedrock and surficial mapping, the latter concentrating on granular aggregate mapping and till analysis, was carried out in the Sisson Branch Reservoir (21 O/6) (1:50 000 scale) (see Figure 1, location 1) and in the Trousers-Long Lake area (21 O/3) (1:25 000 each) (location 2). Bedrock mapping was also carried out in the O/9 map area (1:1320 scale) (location 3) and surficial mapping in the Nepisiguit Lakes area (21 O/7) (1:50 000 scale) (location 4).

The Trousers Lake-Long Lake work was specifically undertaken to determine the effectiveness of the till-metal distribution method as an exploration tool for use in northern New Brunswick. The other mapping projects were directed towards mineral potential and granular aggregate resources evaluation as well as an aid to forest-site classification in the areas cited.

REGIONAL SILT SAMPLING

Reconnaissance geochemical silt sampling was carried out in the panhandle of Madawaska County (parts of 21 N/2, 21 N/6, 21 N/7, and 21 N/8) and the samples analyzed for 10 metallic elements as well as uranium. The results will be available by June 1984.

GRAVIMETRIC SURVEYING

Gravity surveys continued along the eastern flank of the Pokiok Batholith from Kings Landing to Magaguadavic Lake in the 21 G/14 and 21 G/15 areas (see Figure 1, location 6). The purpose of this work was to locate buried granitic stocks similar to that underlying the Lake George antimony deposit. The field work was followed by modelling studies to assist in the structural interpretations of the anomalies discovered.

Gravity and magnetic investigations were carried out in the Miramichi earthquake region (21 O/2 area). Modelling estimates showed a probable thickness of 8 km for the pluton body (North Pole Stream Granite) with a relatively thin cover of metamorphic rocks (0 to 1 km). Because the focal depths are reported to be in the range of 1 to 7 km, it is believed that the Miramichi earthquakes are confined to the rocks of the pluton.

MINERAL POTENTIAL EVALUATION

A number of projects designed to evaluate the mineral potential of the Province were continued. These included a limestone resource inventory (see Figure 1, location 8), oil shale potential evaluation (location 9), peatland inventory (location 10), a stratigraphic and structural study of the tin-tungsten-bearing rocks of the Mount Pleasant caldera (location 11), and an economic evaluation of the gold-bearing rocks of the Bay of Fundy coastal zone (location 12).

MISCELLANEOUS RESEARCH AND FEASIBILITY STUDIES

Two process research projects were carried out by the Department in 1983. These were part of an on-going study to determine the economic viability of New Brunswick oil shale deposits. The work involved fluidized bed combustion tests using local coal and oil shale and the retorting of oil shale. A third contract research study involving potash pillar stability was carried out by John D. Smith Engineering Associates Limited.

Additional work included digital mapping and mineral exploration compilation feasibility studies as well as the presentation of prospecting courses and other public awareness programs.

GEOSCIENTIFIC SURVEYS
NOVA SCOTIA DEPARTMENT OF MINES AND ENERGY

The Nova Scotia Department of Mines and Energy acts on behalf of the Provincial Government in both energy and mineral issues. Within the mineral research sphere, the Department performed a number of projects in 1983. These projects, often multidisciplinary, are aimed at improving knowledge of the geological processes operative in Nova Scotia. It is hoped to thus promote interest in mineral resource exploration and development in the Province.

The operative vehicle for implementing these projects has been the Canada-Nova Scotia Cooperative Mineral Program (CNSCMP), 1981-1984. The $4 million, 2-year project was cost-shared by the Canada Department of Energy, Mines and Resources at 70% and the Nova Scotia Department of Mines and Energy at 30%. The Program continued the excellent record of collaborative geological research conducted by Federal and Provincial scientists over the past decade. Close links to research associates of St. Mary's, Dalhousie, St. Francis Xavier, Acadia, and Ottawa Universities were an integral part of the broad research front. Summer employment for at least 25 student assistants was provided by the programs.

During 1983, the CNSCMP mounted 16 field projects in the Province covering virtually the whole geological spectrum. These are outlined on Figure 1.

Major emphasis was placed on the Meguma Gold Project. The geology of southern Nova Scotia east of Longitude 62°30"W was mapped in detail with specialist studies in selected areas. The ground geological mapping was supplemented by stratigraphic and sedimentological studies. Both airborne and ground gradiometer surveys have proven extremely useful in detecting mappable magnetite-rich marker bands in the host sediments. Selected areas were examined in detail for quartz vein structures and their gold content. The economic geology of the Cochrane Hill gold deposit was studied and a till stratigraphy and geochemical pilot project carried out at the Forest Hill prospect. One of

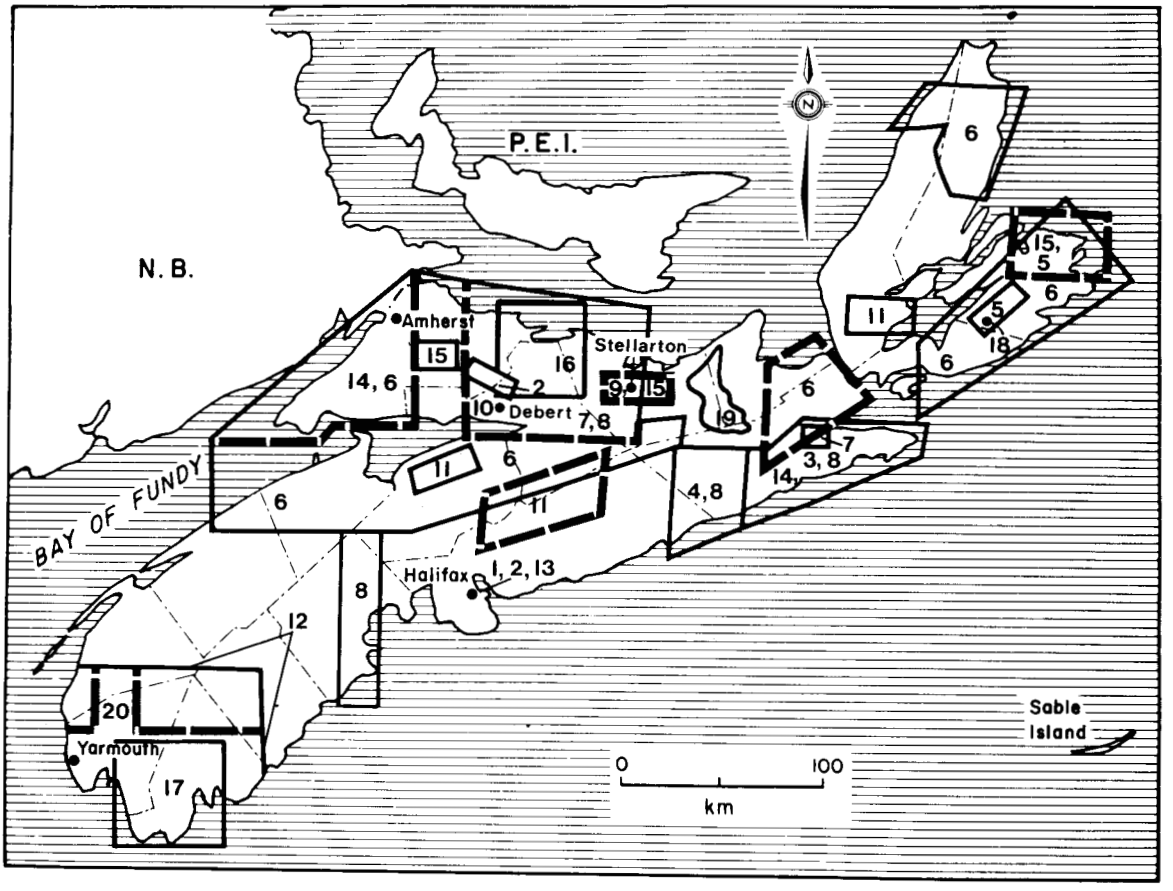


Figure 1 Location of the Canada-Nova Scotia Cooperative Mineral Program projects.

the other principal mineralization modes in the Lower Paleozoic Meguma Group, that of stratabound lead-zinc, was studied at the Eastville deposit. The granitoid intrusive rock hosts for tin and tungsten mineralization were not neglected, with detailed mapping and geochemical sampling programs in the Sangster Lake, Queensport, and Shelburne areas.

The carboniferous sedimentary basins of mainland Nova Scotia host coal deposits plus Cu-Pb-Zn-Ba mineralization. Detailed sedimentological and structural studies were completed in the Sydney Basin and Glengarry Half Graben, where interesting deposits of lead, celestite, and barite are found associated with or at the basal unconformity. The Geological Survey of Canada funded metallogenic studies at the old Yava lead mine in this region.

The area of Debert Lake, in the Cobequid Mountains, contains fluorine-rich alkali basalts with cassiterite. New studies in this area indicate that these basalts may be potential hosts for volcanogenic tin mineralization.

Detailed 1-year projects were conducted in the Antigonish Highland and Tatamagouche areas. New mineral occurrences have been noted during mapping of the Antigonish Highlands. The felsic volcanic rocks have numerous gossan zones, possibly containing stratabound mineralization. In the Upper Carboniferous strata of the Tatamagouche syncline, carbon-rich channel lag sandstones are related almost exclusively to copper, uranium, and recently discovered lead occurrences.

Large scale till mapping, geochemistry, stream, lake sediment and water surveys were continued to define the surficial geology and geochemical characteristics of surface materials in the Province. Most

areas of Nova Scotia have multiple till sections with repeated ice advance and retreat. These studies enable the secondary geochemical dispersion patterns to be elucidated for the various sampling mediums. It is hoped to further identify areas of enhanced mineral potential by compiling and interpreting these patterns.

The study of the industrial minerals potential of the Province (Figure 1) continued with updating aggregate resource data from southwestern Nova Scotia. Annual statistics and locations of principal producers were compiled. The presence in the Province of thick deposits of clay, silica sand, and lignite of Cretaceous age were defined in more detail. Refraction seismic surveys and diamond drilling of selected deposits is underway.

The Mineral Development Division of the Nova Scotia Department of Mines and Energy continued to catalogue raw data as part of the Mineral Inventory program. Indexing and entry into the GEOSCAN national database for bibliographic geological information was increased significantly. All Nova Scotia Department of Mines and Energy publications, assessment reports, open files, and theses have now been catalogued. A new index for gold information is being compiled for publication and is complementary to the metallic minerals index. In addition, documentation of some 5850 drillholes in the Province is presently available from the Drillhole Data Base. The Department also maintains a drill core library for public inspection; during 1983, 124 721 m of new core were acquired and stored in new facilities in Stellarton.

The Nova Scotia Department of Mines and Energy also conducted an education and public awareness program to further general understanding of mineral resource related topics and their impact on the Provincial economy.

Energy topics on-shore concerned peat and coal exploration within the Energy Resources Division of the Nova Scotia Department of Mines and Energy. Coal studies centred on an inventory and geostatistical evaluation of near-surface resources in the Sydney coalfield. The Springhill coalfield was also examined using diamond drilling and sedimentological techniques. The search for alternative energy sources again concentrated on the peatland inventory. Relative tonnages and fuel grade parameters have been estimated from mapped peat deposits on 27 000 ha in the Province. A coincident remote sensing study was jointly performed by the Nova Scotia Land Survey Institute and Nova Scotia Department of Mines and Energy.

Mineral Exploration in 1983 continued at a moderate level, encouraged by a spirit of cautious optimisim in both the public and private sectors of the mineral industry. Expenditures rose over 30% from 1982 levels to an estimated $7.5 million. Major emphasis was placed on gold, tin, and tungsten with a lesser but significant emphasis on barite, base metals, and coal. Some 45 700 claims were held in 1983 for which 1341 exploration, development, and special licences were issued for a total area of 646 240 ha.

ENERGY AND MINERALS BRANCH, PRINCE EDWARD ISLAND DEPARTMENT OF ENERGY AND FORESTRY

The year 1983/84 saw the Prince Edward Island Government negotiating an Economic Regional Development Agreement, a possible component of which is a Mineral Development Subagreement. Pending the completion of this agreement, the activities of the Minerals Branch are on hold.

MINERAL DEVELOPMENT DIVISION NEWFOUNDLAND DEPARTMENT OF MINES AND ENERGY

INTRODUCTION

The Mineral Development Division of the Newfoundland Department of Mines and Energy is responsible for obtaining, interpreting, and disseminating the geoscientific data required for the optimal development of the Province's mineral resources. To that end, the Division carries out continuing

programs in geological mapping, geochemical surveys, mineral deposit studies, Quaternary mapping, and information services. Many of these programs were carried out under a cooperative minerals program with the Federal Department of Energy, Mines and Resources in 1983/84.

GEOLOGICAL MAPPING

The Division fielded 12 geological mapping parties in 1983, 5 in Newfoundland (Figure 1) and 7 in Labrador (Figure 2). Mapping was concentrated in the south-central part of the island of Newfoundland and in the Zn-rich Cambro-Ordovician carbonate terrain along the western coast. In Labrador, mapping continued along the northern margin of Grenville Province and along the boundary between Nain and Churchill Province in the north. The Geological Survey of Canada initiated a mapping program in the Grenville inlier on the Great Northern Peninsula, Newfoundland, as part of the cooperative minerals program.

The Division also released a preliminary version of a new geological map of the island of Newfoundland. The final version will be published at the 1:500 000 scale and will incorporate the results of 1983 and 1984 mapping.

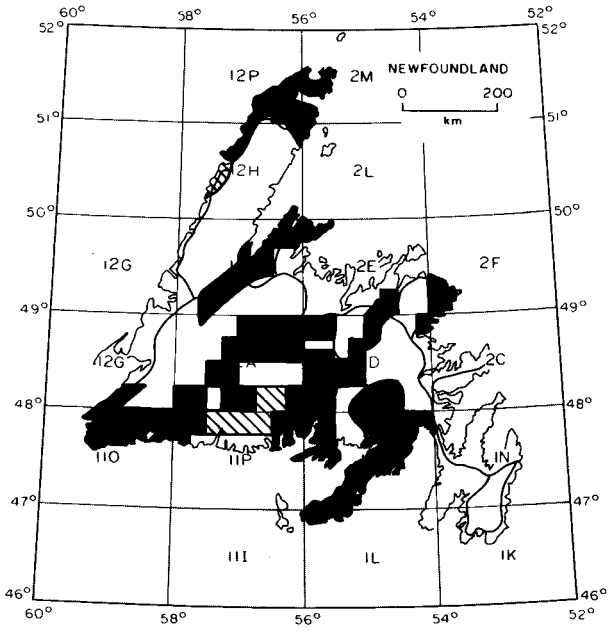


Figure 1 Geological Mapping, Newfoundland.

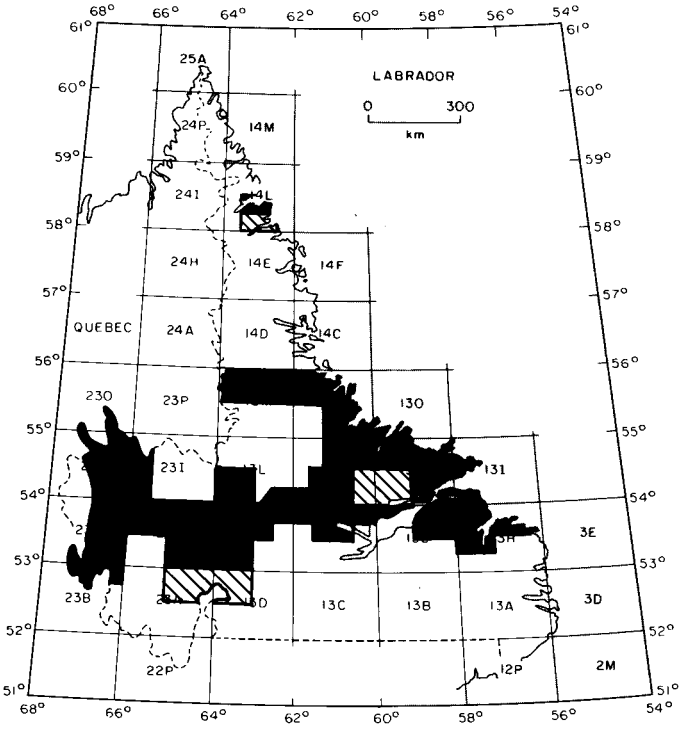


Figure 2 Geological Mapping, Labrador.

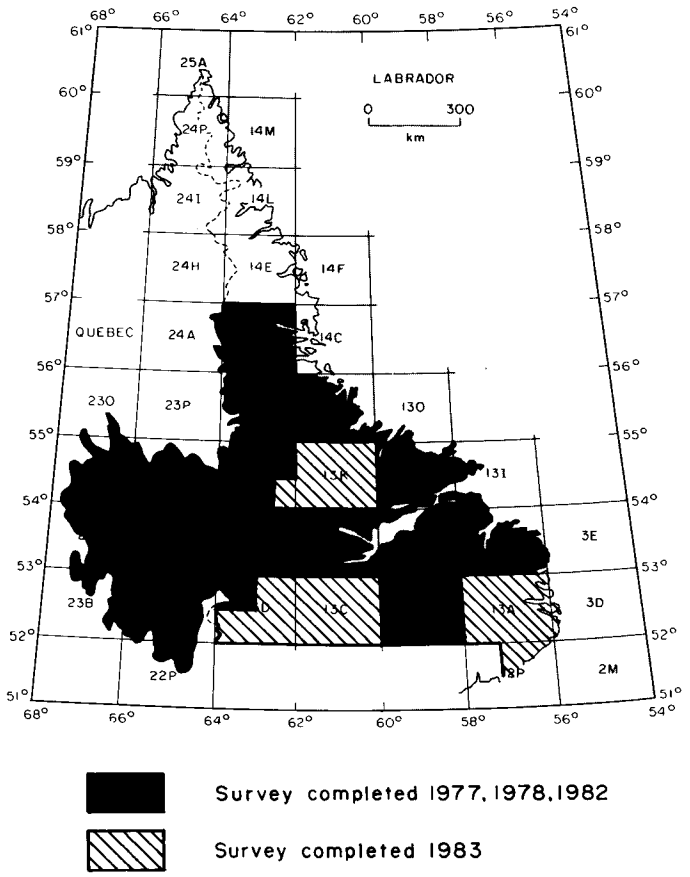


Figure 3 Regional Geochemical Surveys, Labrador.

GEOCHEMISTRY

The Geological Survey of Canada continued its regional lake sediment sampling program in Labrador, under the cooperative program, completing sampling to Latitude 57°N (Figure 3). The Division continued its program of follow-up studies over regional anomalies, concentrating on Y-Nb-Zr-rare earth anomalies in the Strange Lake area of Labrador, tungsten anomalies in southern Newfoundland, and base-metal occurrences in eastern Newfoundland. Follow-up studies are undertaken to evaluate the effectiveness of the regional lake sediment surveys and to test methods of following up the regional data.

MINERAL DEPOSIT STUDIES

The Mineral Deposits Section continued 2 major metallogenic studies, one to assess the mineral potential of clastic sedimentary basins in Newfoundland, the other to define the geological setting of volcanogenic sulphide deposits in western Notre Dame Bay. The section also continued its assessment of barite deposits in the Province, and cooperated with Memorial University in a major study of the geology and mineral potential of the Bay St. George area.

Under the cooperative minerals program, the Geological Survey of Canada continued geophysical and mineralogical work at the Buchans, Tulks, and Skidder deposits, and initiated a detailed geological study at Daniel's Harbour.

QUATERNARY GEOLOGY

The Quaternary Geology Section continued programs in surficial mapping and aggregate resource assessment. Detailed Quaternary mapping was carried out in the vicinity of the Strange Lake deposit in northern Labrador, in cooperation with geochemical follow-up work, and in the Buchans and Weirs Pond areas of central Newfoundland. Aggregate resource assessment was carried out in the vicinity of communities on the coast of Labrador, under the Coastal Labrador Subsidiary Agreement with the Federal Department of Regional Economic Expansion (DREE). More detailed studies were carried out on the island of Newfoundland to provide municipal authorities with information on the aggregate resources within their planning areas. Work continued toward compilation and computerization of the aggregate resource database for the Province.

PUBLICATIONS AND INFORMATION

Results of the Division's field projects were released in some 152 publications and open files during 1983/84. The Publications and Information Section also continued its program of drill core collection and storage, adding some 21 000 m of core to storage facilities at Goose Bay, Pasadena, and St. Johns's. The section continued its information services to the exploration industry and the general public, and its contribution to GEOSCAN, the national geoscientific database.

GEOLOGY DIVISION

DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT, NORTHWEST TERRITORIES

The Northern Affairs Program of the Department of Indian and Northern Affairs administers the quasi-provincial responsibilities for resources, land, economic development, and environment in the Northwest Territories (NWT) that have been retained by the Federal Government. The Northwest Territories Geology Division stationed in Yellowknife, administers the provincial level responsibilities for geology and for the mining and mineral exploration industries within the Territory.

Oil and gas developments are administered by COGLA, a joint DIAND-EMR group, but coal is under DIAND. The Geology Division monitors mining and mineral exploration, collects data on these operations, and maintains an extensive archive of general geology of the territory. A Core Library designed to preserve samples of Northwest Territories rocks and mineral deposits is also maintained. Information, or access to the information and other materials held in the libraries, is provided on request. Division officers advise the Department and other government agencies on mineral, economic geology, and general geological matters.

A major part of the Division's effort goes into providing advice and assistance to prospectors and mineral explorationists who are working in the Northwest Territories. Yearly overviews of mining, exploration, and geological work (by the Division's staff and contractors) and much lengthier reports on mining and exploration activity (Mineral Industry Report for the Northwest Territories) and on geological work (Contributions to the Geology of the Northwest Territories) are published on a regular basis. Preliminary geological maps and reports are released in an open file format as they become available.

During 1984, 4 District Geologists monitored mineral exploration in the 3.24 million km^2 of the Northwest Territories. As few areas are accessible by road, most of our work requires aircraft transportation. This magnifies costs and minimizes effectiveness because of the many days lost to bad weather, and generally waiting for aircraft.

By the end of 1984, $30 million will probably have been spent on various phases of mineral exploration in Northwest Territories. By areas this will likely be: Cordillera $2.4 million; Arctic Islands $3.8 million; Keewatin $4.0 million; South East Mackenzie (including Pine Point) $6.8 million; Slave Structural Province $12.5 million; Bear Province $1.1 million (Figures projected from information available 84-09-05).

ACTIVITIES IN THE GEOLOGICAL DIVISION

The 1984 field components of 21 Geology Division supported projects were completed during August. It is expected that 8 preliminary geological maps will result from various aspects of such work for release during the 1984 Geosciences Forum in December.

The Geology Division publishes most of its output in the form of open files in the Economic Geology Series (EGS). Final maps and reports are presently published in the same series.

EXPLORATION AND GEOLOGICAL SERVICES DIVISION, YUKON DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT

ACTIVITIES 1983/84

The Division took active part in several meetings. A major one took place in Whitehorse in December 1983 sponsored by Geology Division, CIM, Mineral Deposit Division, GAC, and D.I.A.N.D. — Yukon. The topic was 'Mineral Deposits of Northern Cordillera' and an outgrowth will be a CIM Special Volume.

The Cordilleran Exploration and Geology Round-Up was held in Vancouver in late January 1984. D.I.A.N.D. poster displays and verbal presentations were featured alongside the British Columbia Geological Branch and Geological Survey of Canada Cordilleran Division. This meeting was well attended by the exploration fraternity and provided for much useful exchange of information.

A Yukon Mineral Exploration Liaison Committee was formed in early 1984. Its first meeting was held in Whitehorse in February with members drawn from the Yukon Chamber of Mines, Yukon Prospector's Association, Hudson Bay Exploration and Development, CIM — Whitehorse Branch, and the Klondike Placer Miners Association. Chaired by Chief Geologist, Exploration and Geological Services Division, the Committee will informally discuss and evaluate the usefulness and desirability of E.G.S.D. geoscience programs and make recommendations concerning them.

Exploration and Geological Services Division Yukon consists of a staff of 5 geologists, an office manager, a geological technician, and a secretary. During 1983, numeous projects were undertaken by permanent staff members and also individuals on a contract basis, commonly associated with universities.

Jim Morin, Chief Geologist and Regional Manager of the Division, continued his investigations of precious-metal occurrences throughout Yukon. An outgrowth of this will be an open file map depicting all Au-Ag occurrences in Yukon.

Minerals Geologist Grant Abbott divided his 1983 summer between Macmillan Pass and the Rancheria area. At the former, Abbott checked out critical field relationships prior to the release of an open file report on the Geology of the Macmillan Pass Area, 105 O SW, 1:50 000 scale. In the Rancheria area, Abbott investigated many vein and replacement type Ag-Pb-Zn showings. This area is actively being explored by several companies and his observations will be of use to these workers. The regional geologic setting of stratiform shale-hosted Pb-Zn deposits in Selwyn Basin is the subject of a paper Abbott is coauthoring during the fall and winter of 1983/84 with Steve Gordey and Dirk Tempelman-Kluit.

Placer Geologist Steve Morison studied the sedimentology of the White Channel gravels in the Klondike. His 1982 work was released in an open file report in December 1983 as a 1:50 000 scale map, 'Surficial Geology of the Clear Creek Drainage Basin, Parts of NTS 115 P11, 12, 13, and 14'. Steve is also authoring a paper on placer deposits in Canada for the volume 'Geology and Economic Minerals of Canada.'

Staff Geologist Pat Watson compiled maps and production data on the Whitehorse Copper Belt into a 1:25 000 scale map that summaries many of its geologically important features. Pat left the Division in the fall and was replaced by Diane Emond. Diane is currently completing her M.Sc. thesis (Carleton University) on tin mineralization at Oliver Creek, McQuesten River area (EPD property).

Bedrock geology of the Klondike area (western half) was mapped by Ruth Debicki (on contract), staff geologist Kate Grapes, and Lori Walton (term position), and published at 1:50 000 scale in early 1984. This map will provide a much needed base for geologist and prospectors to use in the Klondike area.

Monica Smith-Pride (University of Manitoba) continued her Ph.D thesis study of the Late Cretaceous to Eocene continental volcanic rocks in the Mount Skukum area. These rocks are associated with epithermal precious metal vein systems.

Greg Lynch (Washingon State University) completed his field work on the Kalzas tungsten property such of Mayo. Clastic rocks of the Grit Unit are extensively altered and are cut by a quartz-wolframite-tourmaline vein and stockwork system. The style of mineralization is unique in Yukon and has important metallogenic implications regarding metals and their associations with granitic plutons.

Michael Dufresne (University of Alberta) spent the first of 2 summer's field work studying alteration near the bedrock interface within and below the White Channel gravels in the Klondike area. This argillic alteration is locally pervasive and has been proposed by Dirk Tempelman-Kluit to be related to ground water dissolution, transportation, and deposition of gold.

Bob Turner (Standford University) completed his field work investigating the sedimentology of stratiform Pb-Zn-Ag mineralization in the JASON deposit at Macmillan Pass. One of the major problems in the study involves the differentiation of replacement mineralization from syngenetic mineralization.

Linda Benton (Dartmouth University) received partial support for her M.Sc. thesis on primary nitrogen dispersion haloes in shale-hosted stratiform sulphide deposits, using TOM, JASON, and Clear Lake as study candidates.

Grant Lowey (University of Calgary) completed his Ph.D. field work examining the sedimentology of Late Cretaceous conglomerates in western Crystalline Terrane. He has determined through palynomorph examination that these conglomerates previously thought to be Eocene are Early to Late Cretaceous.

GEOLOGICAL PUBLICATIONS

PROVINCIAL AND TERRITORIAL SURVEYS

1983 — 1984

BRITISH COLUMBIA

PUBLISHED OUTPUT 1983/84

Paper 1983-3: *Geology of the Princeton Basin,* by R.D. McMechan.

Paper 1984-1: *Geology Fieldwork, 1983* – A preliminary account of work of the Branch presented as soon as possible after the field season. Articles within this report include:

Church, B.N. *Geology and Self Potential Survey of the Sylvester K Gold-Sulphide Prospect (82 E 2E),* p.7-14.

The Farleigh Lake Radioactive Occurrence (82 E/5W), p.15-18.

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Anglin, C.D., and Macdonald, A.J. *"Gold Mineralization and Iron Formation Bearing Lithotectonic Zone, Beardmore-Geraldton, Ontario".* Geological Association of Canada/Mineralogical Association of Canada Conference, London, May 14-16, 1984.

Baker, C.L. *"Kimberlite Finds in the Kirkland Lake Area - New Glitter for an Old Gold Camp".* Prospectors and Developers' Association Annual Meeting, March 1984.

Beakhouse, G.P. *"Gold Potential of the Sub-province Boundaries".* Talk given at exploration Seminar, Thunder Bay and Kenora, February 1984.

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Colvine, A.C., Marmont, S., Macdonald, A.J., Cherry, M.E., and Lavigne, M.J. *"Geological Fundamentals and Gold".* Series of lectures hosted by Ontario Geological Survey, Queen's Park, March 8, 1984.

Dressler, B.O. Field trip, Sudbury Basin, for German University Group, fall 1983.

Easton, R.M. *"Pre-Yellowknife Supergroup Basement in the Point Lake Area, N.W.T., Results of a Trace and REE Provenance Study".* Geological Association of Canada, Victoria, B.C., 1983.

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Easton, R.M., and Gaiswinkler, M. *"Effects of Weathering on Trace and REE Contents of Volcanic Sediments, Island of Hawaii, U.S.A.".* Geological Association of Canada, Victora, B.C., 1983.

Easton, R.M., and Johns, G.W. *"Physical Volcanology-Application to Exploration — Modern Examples".* Talk given at exploration seminar, Timmins, February 1984.

Ford, M.J., and Geddes, R.S. *"Quaternary Geology of Algonquin Park".* Waterloo Quaternary Discussion Group, University of Waterloo, November 30, 1983.

Geddes, R.S. *"Drift Prospecting".* Lecture to Department of Geology, University of Western Ontario, London, December 5, 1983.

Geddes, R.S., Baker C.L., Sado, E.V., Ford, M.J., and Vagners, U.J. A presentation of 5 talks on the *Quaternary Geology of Selected Ontario Gold Camps,* Toronto Quaternary Discussion Group, Toronto, November 21, 1983.

Grunsky, E.C. *"Recognition of Alteration in Volcanic Rocks Using Lithogeochemistry and Statistical Analysis".* Association of Exploration Geochemists, Reno, Nevada, 1984.

Jensen, L.S. *"Geology of the Abitibi Belt".* Talk for N.A.S.A. Workshop *"Cross-Section of the Archean Crust"* August 1983.

Johns, G.W., and Easton, R.M. *"Physical Volcanology - Applications to Exploration -- Facies Models, Modern and Ancient Examples".* Talk given at exploration seminar, Thunder Bay and Kenora, February 1984.

Lavigne, M.J., and Crocket, J.H. *"Gold in Iron Formation, Red Lake, Ontario".* Geological Association of Canada, May 14-16, 1984.

Macdonald, A.J. *"Computerized Information Services at the Ontario Geological Survey".* Computer Applications in Mineral Exploration Conference, Toronto, February 1984.

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Macdonald, A.J., and Ray, G.E. *"Fluids Responsible for Lode Gold Deposition in the Cordillera and the Superior Province; Implications for a Cost-Effective Exploration Technique"*. Geological Association of Canada Cordilleran Section Symposium: Cordilleran Geology and Mineral Exploration: Status and Future Trends, Annual Conference, Vancouver, February 1984.

Muir, T.L. *"The Onaping Formation"*. Talk Presented at Canadian Institute of Mining and Metallurgy Meeting, Sudbury, October 1983.

Field trip, Hemlo area, for mining company personnel (joint with G.C. Patterson, Ministry of Natural Resources, Thunder Bay), 1983.

"Regional Geology of the Hemlo Camp". Talk presented at the McGill University "Exploration for Gold" professional seminar, January 16-20, 1984.

Muir, T.L., and Dressler, B.O. *Field trip, Onaping Formation and Sudbury Basin,* for H-U Schminke, 1983.

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Riddle, Chris, and Vander Voet, Tony *"Analytical Methods in Geoanalysis"*. 20 lecture course offered to Ontario Geological Survey staff.

Riley, J.L. *"Hudson Bay Lowland"*. University of Waterloo, Earth Sciences Department, Extension Services, January 1984.

Sado, E.V., Leader, *Field Trip — Quaternary Geology of Middlesex County for Ontario Institute of Pedology,* June 21, 1983.

"The Value of the Quaternary Geology and the Surficial Geology Mapping Program to the M.N.R. Acid Rain Programme". Talk, MNR Symposium on Acid Rain, February 15, 1984.

Sado, E.V. (with D.G. Minnes and W.J. Logan) Co-Leaders, *Field Trip A — Industrial Mineral Industries for 19th Forum on the Geology of Industrial Minerals,* May 26, 1983.

Sade, E.V., White, O.L., Barnett, P.J., and Sharpe, D.R. Co-Leaders, *Field Trip for York Symposium on Correlation of Quaternary Chronologies,* May 29, 1983.

Sage, R.P. *Field trip for N.A.S.A. Workshop on "Cross-Section at the Archean Crust"*, August 1983.

Field trip, Wawa area, for mining company and university geologists, August 1983.

Field trip, Coldwell Alkalic Complex, for mining company and university geologists, August 1983.

Scott, D.W. *"Aggregate Resources Inventory Program in Ontario."* Given at the Annual Conference of the Aggregate Producers' Association of Ontario, Niagara Falls, Ontario, February 16-17, 1983.

Scott, D.W., and Yundt, S.E. Leaders, *"Field Trip B: Industrial (Aggregate, Stone, and Glass)"* during 19th Forum on the Geology of Industrial Minerals, Toronto, Ontario, May 26, 1983.

Springer, J.S. *"Active Carbon in Archean Rocks and Its Effect on Gold Mineralization"*. Geological Association of Canada/Mineralogical Association of Canada Conference, London, May 14-16, 1984.

Telford, P.G., and Riley, J.L. *"Use of LANDSAT Feature and Theme Imagery in the Ontario Peatland Inventory"*. Symposium on Remote Sensing in Peat and Terrain Resource Surveys, International Peat Society, September 1983, Aberdeen Scotland (Lecture delivered by T.E. Tibbetts).

Thurston, P.C., Ayres, L.D., Gelinas, L., Ludden, J.N., Verpaelst, P., and Edwards, G. *"Archean Bimodal Volcanism — Tectonic Complications"*. Talk given at University of Manitoba, Winnipeg, February 1, 1984.

Thurston, P.C., Beakhouse, G.P., and Muir, T.L. *"Volcanic Cyclicity in Mineral Exploration: The Caldera Cycle and Zoned Magma Chambers"*. Talk given at exploration seminar, Thunder Bay and Kenora, February 1984.

Thurston, P.C., **et al**. *"Volcanisme Bi-Modale — Implications Tectonique pour l'Archeen"*. Talk given at the University of Quebec at Montreal, April 1983.

Troop, D.G. *"Computer Applications on Gold Deposits in the Abitibi Belt"*. Timmins Geological Discussion Group, February 1984.

Trowell, N.F., and Jensen, L.S. *"Volcanic Stratigraphy and Mineral Deposits in the Abitibi Belt"*. Talk given at exploration seminar, Timmins, February 1984.

Vander Voet, A. *"Determination of Yttrium and Selected Rare Earth Elements in Geological Materials Using High Performance Liquid Chromatographic Separation and ICP Spectrometric Determination"*. 1984 Winter Conference on Plasma Spectrochemistry, San Diego, January 1984.

Vos, M.A. *"Industrial Minerals the Substance of Industrial Geology"*. Industrial Minerals Conference, September 20, 1983.

Wallace, H. General Geology and Mineralization — Red Lake". *Talk presented at Ontario Geological Survey, Special Topics Seminar "Geological Fundamentals and Gold", March 8, 1984.*

Wallace, H., Thurston, P.C., and Corfu, F. "The Western Uchi Subprovince: A Case Study in Stratigraphic Analysis in Mineral Exploration". Talk given at exploration seminar, Thunder Bay and Kenora, February 1984.

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Wallace, H., and Trowell, N.F. *"Regional Stratigraphy in Gold Exploration"*. Talk presented at Ontario Geological Survey Special Topics Seminar "Geological Fundamentals and Gold", March 8, 1984.

Wood, J., and Colvine, A.C. *Geology of the Cobalt Area, field trip for mining company geologists,* July 1983.

CONFERENCES ATTENDED BY MEMBERS OF STAFF

May 11-13, 1983 Geological Association of Canada/Mineralogical Association of Canada Annual Meeting, Victoria, B.C.

May 24-27, 1983 19th Forum on the Geology of Industrial Minerals, Toronto, Ontario.

May 26-29, 1983 York Symposium on the Correlation of Quaternary Chronologies, York University, Toronto.

June 28-30, 1983 Society of Professional Well Log Analysts/Canadian Well Logging Association, Joint Meeting, Calgary, Alberta.

August 1983 NASA Workshop A cross-section of the Archean Crust - Kapuskasing Structural Zone, Chapleau-Timmins, Ontario.

September 1983 A. Vander Voet chaired seminar session at Canadian Scientific Suppliers Association Annual Toronto Meeting, on Plasma Spectrochemistry.

September 12-15, 1983 International Symposium on Engineering Geology and Underground Construction, Lisbon, Portugal.

September 16-18, 1983 Till Workshop, New York State Geological Survey, Albany, N.Y.

September 18-22, 1983 "Energy from Peat — Symposium 83", St. John's, Newfoundland.

September 21-22, 1983 2nd Canadian Oil Shale Workshop at University of Waterloo.

September 25-30, 1983 Volcanology and Ore Deposits Seminar and Field Trip, San Juan Mountains Colorado, U.S.A.

October 1983 Friends of the Grenville Field Trip and Conference, Lake Placid, New York, U.S.A.

October 14-16, 1983 22nd Annual Meeting of Ontario Petroleum Institute, London, Ontario.

October 31 — November 3, 1983 Geological Society of America Annual Meeting, Indianapolis, Indiana, U.S.A.

November 14-16, 1983 3rd Eastern Oil Shale Symposium, Lexington, Kentucky.

November 23, 24, 1983 Ministere de l'Energie et des Ressources Quebec, Open House-Quebec, P.Q.

January 9-11, 1984 Computer Applications and Mineral Exploration Symposium, Toronto.

January 17, 1984 Geological Survey of Canada Forum, Ottawa.

February 1, 1984 Geological Association of Canada/Mineralogical Association of Canada Meeting.

February 1, 1984 6th Industrial Minerals International Congress, Toronto.
February 16-17, 1984 Annual Conference of the Aggregate Producers of Ontario, Niagara Falls, Ontario.

March 4-7 Prospectors and Developers' Association Annual Convention, Toronto.

March 25-28, 1984 Society of Exploration Geochemists, Reno, Nevada, U.S.A.

QUEBEC

LITHOGRAPHIES

Série ET

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Série MM

82-01 *Partie sud-ouest de la région de Laurentides;* Y. Globensky.

82-02 *Région de la gorge Prosper;* A. Franconi.

83-02 *Carte lithostratigraphie de la région de Chibougamau;* A. Gobeil, D. Racicot.

Série DV

82-01 *Géochimie des eaux souterraines: méthodologie de l'échantillonnage et résultats des essais;* J.-P. Lalonde, N. Chouinard.

82-02 *Atlas géochimique des sédiments de ruisseau de la partie occidentale de la région de la baie des Chaleurs;* G. Gagnon.

83-02 *Atlas géochimique des eaux souterraines et de sols de la région de Témiscamingue;* J.-P. Lalonde, M. Pelletier.

83-03 *Gîtologie et métallogénie des minéraux du Québec: compilation et analyse des écrits pour la période 1950-1981;* P. Trudel.

83-05 *Rapport des géologues résidents pour l'année 1982;* G. Duquette, A. Gobeil, M. Latulippe, P. Marcoux, M. Rive, A. Vallières.

83-06 *Excursion géologique autour des monts McGerrigle;* G. Duquette.

83-11 *Stratigraphie des ensembles volcanosédimentaires archéens de l'Abitibi: état des connaissances;* G.-O. Allard, P. Archer, J. Babineau, J. Carignan, J.-M. Charbonneau, E.H. Chown, R. Daigneault, E. Dimroth, L. Dupuis-Hébert, D. Francis, A. Franconi, E. Gahe, C. Gariépy, L. Gélinas, A. Gobeil, N. Goulet, J. Guha, Y. Hébert, M. Hocq, C. Hubert, L. Imreh, M. Jutras, J. Lajoie, D. Lamothe, K. Lauzière, J.N. Ludden, W. Muller, S. Paradis, G. Parent, C. Picard, M. Piché, M. Rocheleau, M.K. Séguin, K.N.M. Sharma, A. Simard, P. Simoneau.

83-12 *Les citoyens et la révocation des droits miniers des Cantons de l'Est;* J. Dugas, L. Lalibert, A. Vallières.

83-13 *Travaux sur le terrain en 1983;* Direction générale de l'Exploration géologique et minérale.

Série GT

7 *Cours inférieur de la rivière Montmorency;* J. Riva.

8 *Esker du lac Berry;* J. Rondot.

9 *Région de Saint-Majoric;* J. Rondot.

10 *Région de Saint-Edgar;* J. Rondot.

Série REPERES

11 Mars – avril 1983

12 Mai – juin 1983

13 Juillet – août 1983

14 Septembre octobre 1983

15 Novembre – décembre 1983

16 Janvier février 1984

Série DPV

845 *Répertoire des fiches de gîte minéral du Québec.* 2e édition; Service de la Géoinformation.

940 *Carte des gîtes minéraux du Québec – région de la baie James;* Service de la Géoinformation.

REPRODUCTIONS CONTACT

Série DP

83-01 *Géochimie des sédiments de ruisseau de la région du lac Kipawa;* J.-P. Lalonde.

83-02 *Synthèse métallogénique du gîte Sullipek et de ses environs;* R. Wares.

83-03 *Evolution thermique de l'extrémité orientale de la péninsule de Gaspé en relation avec les déformations tectoniques;* INRS-Géoressources.

83-04 *Géologie du secteur ouest de l'archipel de Mingan;* A.-L. Desrochers.

83-05 *Levé EM héliporté, région de l'Outaouais;* Les Relevés Géophysiques Inc.

83-06 *Géologie des groupes de Mictaw et de Maquereau, région de Port-Daniel;* G. de Broucker.

83-07 *Géologie de la partie sud-est de la région d'Arthabaska;* A. Caron.

83-08 *Levé INPUT dans la région de Martin-Barry, district de Chibougamau; Les Relevés Géophysiques Inc.*

83-09 *Gîtologie et métallogénie dans la région du mont Bourbeau, district de Chibougamau;* P. Pilote.

83-10 *Pédogéochimie, région de Brouillan;* M. Beaumier.

83-11 *Données brutes de l'échantillonnage des sols de la région de Val-Saint-Gilles, Abitibi-Ouest;* M. Beaumier.

83-12 *Géologie de la région du lac Norman;* L. Kish, R. Bourque.

83-13 *Potentiel minéral de la région de Nouvelle, Gaspésie;* C. Gosselin, M. Simard.

83-14 *Carte aéromagnetique à 1:20 000; régions de la rivière Turgeon et de Joutel-Poirier;* Service de Géochimie-Géophysique.

83-15 *Données brutes de l'échantillonnage des sédiments de ruisseau des régions de La Motte et de Lacorne;* M. Leduc.

83-16 *Géologie de la région du Bas Saguenay;* J. Rondot.

83-17 *Levé INPUT dans la région de la riviére Broadback;* Les Relevés Géophysiques Inc.

83-18 *Données complémentaires au levé de sédiments de lac dans la région de la rivière George, Territoire-du-Nouveau-Québec;* M. Beaumier.

83-19 *Evaluation du potentiel minéral de la région de Saint-Fabien;* J. Henry.

83-20 *Géochimie des sédiments de ruisseau de la région du réservoir Cabonga;* Service de Géochimie-Géophysique.

83-21 *Géologie de la région de Warwick;* A. Caron

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1984b: *Stream Sediment Geochemistry of the Framboise Map Sheet, Scale 1:50 000;* Nova Scotia Department of Mines and Energy, Open File Map 84-08. 13 maps (stream sediment geochemical; stream sediment sample location); histograms. Also Geological Survey of Canada, Open File 982.

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1984d: *Stream Sediment Geochemistry of the Cape North Map Sheet, Scale 1:50 000;* Nova Scotia Department of Mines and Energy, Open File Map 84-10. 13 maps (stream sediment geochemical; stream sediment sample location); histograms. Also Geological Survey of Canada, Open File 984.

1984e: *Stream Sediment Geochemistry of the Cape St. Lawerence Map Sheet, Scale 1:50 000;* Nova Scotia Department of Mines and Energy, Open File Map 84-11. 13 maps (stream sediment geochemical; stream sediment sample location); histograms. Also Geological Survey of Canada, Open File 985.

1984f: *Stream Sediment Geochemistry of the Pleasant Bay Map Sheet, Scale 1:50 000;* Nova Scotia Department of Mines and Energy, Open File Map 84-12. 13 maps (stream sediment geochemical; stream sediment sample location); histograms. Also Geological Survey of Canada, Open File 986.

1984g: *Stream Sediment Geochemistry of the Dingwall Map Sheet, Scale 1:50 000;* Nova Scotia Department of Mines and Energy, Open File Map 84-13. 13 maps (stream sediment geochemical; stream sediment sample location); histograms. Also Geological Survey of Canada, Open File 987.

Wentzell, B.D. 1983a: *Geological Map of the 0'00 ft.-170 ft. Plan Interval, Country Harbour Head, Scale 1:60;* Nova Scotia Department of Mines and Energy, Open File Map 84-04. 1 map (geological; rock sample location).

1983b: *Geological Map of the 410 ft.-460 ft. Plan Interval, Country Harbour Head, Scale 1:60;* Nova Scotia Department of Mines and Energy, Open File Map 84-05. 1 map (geological; rock sample location).

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Chatterjee, A.K. 1983: *Lithogeochemistry as an Indicator of Uranium and Tin Mineralization, South Mountain Batholith, Nova Scotia, Canada;* Journal of Geochemical Exploration, Volume 19.

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1984b: *Discriminant and Factor Analysis of Geochemical Data from Granitoid Rocks Hosting the Millet Brook Uranium Mineralization, South Mountain Batholith, Nova Scotia;* Uranium, Volume 1, Number 4, Elsevier Science Publishers B.V., Amsterdam, p.289-305.

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Fowler, John H. 1984: *Industrial Minerals in Canada — A Review of Recent Developments, Nova Scotia;* Industrial Minerals, Number 200, May, p.67-70.

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Johnson, R.J.E., Van der Voo, R., and Keppie, J.D. 1983: *The Paleozoic Drift of Avalon Basement Terrane of Nova Scotia;* EOS, American Geophysical Union Transactions, Volume 64, November, p.690.

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MacEachern, I.J., Stea, R.R., and Rogers, P.J. 1984: *Till Stratigraphy and Gold Distribution, Forest Hill Gold District, Nova Scotia;* p.651-654 in Current Research, Part A, Geological Survey of Canada, Paper 84-1A.

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ABSTRACTS OF PAPERS PRESENTED AT CONFERENCES

Boehner, R.C. 1984: *Carboniferous Basins in Eastern Cape Breton Island-Near But Yet So Far;* Presented at The Atlantic Geoscience Society Colloquium on Current Research in the Atlantic Provinces, Amherst, Nova Scotia, January 20-21. Abstract in Atlantic Geoscience Society Colloquium on Current Research in the Atlantic Provinces Abstracts, p.5.

Calder, J.H. 1984: *Depositional Environment of the Westphalian B Cumberland Basin Coals of Springhill, Nova Scotia;* Presented at The Atlantic Geoscience Society Colloquium on Current Research in the Atlantic Provinces, Amherst, Nova Scotia, January 20-21. Abstract in Atlantic Geoscience Society Colloquium on Current Research in the Atlantic Provinces Abstracts, p.7.

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Dallmeyer, R.D., and Keppie, J.D. 1984: *Geochronological Constraints on the Accretion of the Meguma Terrane with North America;* Presented at 19th Annual Meeting, Northeastern Section of the Geological Society of America, Providence, Rhode Island, March. Published in Abstracts with Programs, 1984, 19th Annual Meeting, Northeastern Section, The Geological Society of America, Volume 16, Number 1, January, p.11.

Dostal, J., Keppie, J.D., and Murphy, J.B. 1984: *Avalonian Volcanic Rocks of Nova Scotia;* Presented at 19th Annual Meeting, Northeastern Section of the Geological Society of America, Providence, Rhode Island, March. Published in Abstracts with Programs, 1984, 19th Annual Meeting, Northeastern Section, The Geological Association of America, Volume 16, Number 1, January, p.12.

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Lyttle, N.A. 1984: *Mineral Resources Information Data Bases in the Nova Scotia Department of Mines and Energy;* Presented at The Atlantic Geoscience Society Colloquium on Current Research in the Atlantic Provinces, Amherst, Nova Scotia, January 20-21. Abstract in Atlantic Geoscience Society Colloquium on Current Research in the Atlantic Provinces Abstracts, p.21.

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O'Brien, B.H. 1983: *Fold and Cleavage Development in an Appalachian Slate Belt;* Presented at The Canadian Tectonics Group Annual Meeting and Workshop, Jasper, Alberta, October.

Rogers, P.J., Stea, R.R., and MacDonald, M.A. 1984: Statistical Investigation of the Geochemical Reflection of Au Mineralization in the Tills and Lake Sediments of the Eastern Shore Region of Nova Scotia; Presented at Sixth International Symposium of the Institution of Mining and Metallurgy, Glasgow, Scotland, May. Published in Prospecting in Areas of Glaciated Terrain, The Institution of Mining and Metallurgy, p.137-151.

Stea, R.R. 1984: Quaternary Mapping and Stratigraphic Studies in Northern Mainland Nova Scotia; Presented at The Atlantic Geoscience Society Colloquium on Current Research in the Atlantic Provinces, Amherst, Nova Scotia, January 20-21. Abstract in Atlantic Geoscience Society Colloquium on Current Research in the Atlantic Provinces Abstracts, p.39-40.

PRINCE EDWARD ISLAND

1983/84 Publication

van de Poll, H.W. 1983: Geology of Prince Edward Island; Province of Prince Edward Island, Department of Energy and Forestry, Energy and Minerals Branch, Report 83-1.

NEWFOUNDLAND

LIST OF PUBLICATIONS, 1983/84

Memoir 1: Geology of the Carboniferous Bay St. George Subbasin, Western Newfoundland, by Ian Knight. Includes Map 82-1 (coloured) and illustrations. Report, 358p.

Report 83-1: Current Research. Contains technical reports on 1982 field and office projects of the Mineral Development Division. Compiled and edited by M.J. Murray, P.D. Saunders, W.D. Boyce, and R.V. Gibbons. Report 228p.

Report 83-2: Inventory of Aggregate Resources in Newfoundland and Labrador – Report and Index Maps by F.T. Kirby, R.J. Ricketts, and D.G. Vanderveer. (To accompany aggregate resource Map Series, 1:250 000 – Open Files Nfld. 1287 and Lab. 602).

Aggregate Resource Maps to accompany this report are:

Open File Nfld. 1287
83-01 Trepassey, 1 K
83-02 St. Lawrence, 1 L
83-03 Port aux Basques, 11 O
83-04 Burgeo, 11 P and 11 I
83-05 Belleoram, 1 M
83-06 St. John's, 1 N
83-07 Bonavista, 2 C
83-08 Gander Lake, 2 D
83-09 Red Indian Lake, 12 A
83-10 Stephenville, 12 B
83-11 Bay of Islands, 12 G
83-12 Sandy Lake, 12 H
83-13 Botwood, 2 E
83-14 Wesleyville, 2 F
83-15 Port Saunders, 12 I
83-16 Blanc-Sabon, 12 P
83-17 St. Anthony, 2 M

Open File Lab. 602
83-18 Minipi Lake, 13 C
83-19 Lac Joseph, 23 A
83-20 Opocopa Lake, 23 B
83-21 Shabogamo Lake, 23 G
83-22 Osokmanuan Lake, 23 H
83-23 Winokapau Lake, 13 E
83-24 Goose Bay, 13 F
83-25 Rigolet, 13 J
83-26 Snegamook Lake, 13 K
83-27 Kasheshibaw Lake, 13 L
83-28 Shefferville, 23 J
83-29 Makkovik, 13 O

Report 83-3: Fossils of Northwestern Newfoundland and Southeastern Labrador – Conodonts and Trilobites, by Svend Stouge and W. Douglas Boyce.

Report 83-4: Geology of the King George IV Lake Map Area (N.T.S. 12 A/4), Newfoundland, by B.F. Kean. (Includes 1:50 000 scale geology map plus cross-section). Report, 67p.

Report 83-5: *Geology of the Baine Harbour (1 M/7) and Point Enragee (1 M/8) Map Areas, Southeastern Newfoundland*, by S.J. O'Brien and S.W. Taylor. (Includes two 1:50 000 scale geology maps plus a cross-section).

Report 83-6: *Geology, Geochemistry and Mineral Potential of the Ackley Granite and Parts of the North West Brook and Eastern Meelpaeg Complexes, Southeast Newfoundland (Parts of Map Areas 1 M/10, 11, 14, 15, 16; 2 D/1, 2, 3, and 7)*, by W.L. Dickson. (Includes 1:100 000 scale geology map). Report, 130p.

Report 83-7: *Geology of the Grandys Lake Map Area (11 O/15), Newfoundland. Part I* by Lesley Chorlton, *Part II* by Ian Knight. Includes 1:50 000 scale geology map and cross section. Report, 125p.

Report 83-9: *Fluorspar Deposits of the St. Lawrence Area, Newfoundland: Geology and Economic Potential*, by Ambrose Howse, Paul Dean, Scott Swindon, Baxter Kean, and Ford Morrissey.

Preliminary Current Research: Contains preliminary technical reports on 1983 field and office projects of the Mineral Development Division. M.J. Murray and R.V. Gibbons (editors).

Report 84-1: *Current Research. Contains technical reports on 1983 field and office projects of the Mineral Development Division.* Compiled and edited by M.J. Murray, J.G. Whalen, and R.V. Gibbons.

Report 84-2: *Reconnaissance and Detailed Geochemical Surveys for Base Metals in Labrador*, by John McConnell. (Report consists of 113 pages including fully illustrated coloured maps).

Batterson, Martin J. 1984: *Surficial Geology of the Waterford River Basin, St. John's, Newfoundland*: Urban Hydrology Technical Report Number 1.

NEWFOUNDLAND MINERAL OCCURRENCE MAPS

(Scale 1:250 000 unless otherwise specified)

Map 8421 2 C, *Bonavista Area*

Map 8422 13 N, *Hopedale Area*

Map 8423 2 F, *Wesleyville Area*

Map 8424 2 M, *St. Anthony Area*

Map 8425 12 P, *Blanc Sablon Area*

LABRADOR MINERAL OCCURRENCE MAPS

(Scale 1:250 000 unless otherwise specified)

Map 8336 13 K, *Snegamook Lake*

Map 8337 13 K 5, *Winokapau Lake* (1:50 000)

Map 8347 Parts of 13 J and 13 O, *Kaipokok Bay Big River* (1:100 000)

NEWFOUNDLAND GEOLOGY MAPS

Map 83106, *New preliminary coloured geological map of Newfoundland*, by Jim Hibbard, 1983. Scale 1:1 000 000.

Map 83107, *Dolland Brook (11 P/15W), Newfoundland*, by R.F. Blackwood, 1983. Scale 1:50 000.

Map 83108, *Cold Spring Pond (12 A/1), Newfoundland*, by S.P. Colman-Sadd (1982, 1983), and by H.S. Swinden (1981), northeast quadrant. Scale 1:50 000.

Map 83109, *White Bear River (11 P/14), Newfoundland*, by S. O'Brien and S. Tomlin, 1983. Scale 1:50 000.

Map 83110, *St. John Island (12 I/14), Newfoundland*, by I. Knight, W.D. Boyce, and K. Austin (1983), I. Knight (1982). Scale 1:50 000.

Map 83111, *Port Saunders (12 I/11), Newfoundland*, by I. Knight, W.D. Boyce, and K. Austin (1983), I. Knight (1982). Scale 1:50 000.

Map 8426, *Geology of the Dolland Brook Map Area (N.T.S. 11 P/15E)*, Newfoundland, by W.L. Dickson, 1984. Scale 1:50 000.

Map 8427, *Geology of the Wolf Mountain Map Area (N.T.S. 12 A/2E), Newfoundland*, by W.L. Dickson, 1984. Scale 1:50 000.

Map 8428, *Geology of the D'Espoir Brook Map Area (N.T.S. 11 P/16), Newfoundland*, by W.L. Dickson, 1984. Scale 1:50 000.

LABRADOR GEOLOGY MAPS

Map 8330, *Metchin River (13 E/11), Labrador*, by A. Thomas, V. Jackson, and G. Finn (1980). Scale 1:100 000.

Map 8330A. *This map contains the information on Map 8330 plus geochemical sample locations.*

Map 8331, *Letitia Lake-Wapustan Lake Area, Labrador (13 L/1, 13 K/4, and Parts of 13 L/2 and 13 L/8)*, by A. Thomas and D. Hibbs (1978 and 1979); in part compiled from Brummer and Mann (1961), Curtis and Currie (1981), and Emslie et al. (1978). Scale 1:100 000.

Map 8331A. *This map contains the information on Map 8331 plus geochemical sample locations.*

Map 8332, *Hope Lake-Disappointment Lake Area, Labrador (13 E/9, 10, 15, 16)*, by A. Thomas, V. Jackson, and G. Finn (1980); in part compiled from Curtis and Currie (1981) and Emslie et al. (1978). Scale 1:100 000.

Map 8332A. *This map contains the information on Map 8332 plus geochemical sample locations.*

Map 8333, *Mountaineer Lakes-East Red Wine Mountains Area (13 F/12, 13), Labrador*, by A. Thomas, V. Jackson, and G. Finn (1980). Scale 1:100 000.

Map 8333A. *This map contains the information on Map 8333 plus geochemical sample locations.*

Descriptive notes and geological maps of the Makkovik Subprovince between Kaipokok Bay and Bay of Islands, Labrador, by A.B. Ryan, A. Kay, and I.F. Ermanovics, 1981. Scale 1:50 000.

Map 8338 *Post Hill* 13 J/13E
Map 8339 *Post Hill* 13 J/13W
Map 8340 *Bay of Islands* 13 O/14E
Map 8341 *Bay of Islands 13 O/14W*

Map 8342, Rigolet (Part of 13 J), Labrador, by C.F. Gower, 1979; and C.F. Gower, N. Noel, and R.T. Gillespie, 1980. Scale 1:100 000.

Map 8343, *Groswater Bay Area (Parts of 13 J and 13 I), Labrador*, by C.F. Gower, 1979, and C.F. Gower, N. Noel, and R.T. Gillespie, 1980. Scale 1:100 000.

Map 8344, *English River Area (Part of 13 G), Labrador*, by N. Noel, R.T. Gillespie, and C.F. Gower, 1980; and C.F. Gower and G. Finn, 1981. Scale 1:100 000.

Map 8345, *Sandwich Bay Area (Part of 13 H), Labrador*, by C.F. Gower, N. Noel, and R.T. Gillespie, 1980; and C.F. Gower, G. Finn, and V. Owen, 1981. Scale 1:100 000.

Map 8346, *Table Bay Area (Part of 13 H), Labrador*, by V. Owen, C.F. Gower, and G. Finn, 1981. Scale 1:100 000.

Map 8420, *Geology of the North West River Area (N.T.S. 13 F/9), Labrador*, by R.J. Wardle and C. Ash, 1984. Scale 1:100 000. (1 map plus accompanying notes).

OPEN FILES

1K (19) Meyer, J.R., Butler, A.J., and Davenport, P.H. 1983: *Avalon South (Stream Sediment Geochemistry)*. The sampled area is located on the Avalon Peninsula. This survey covers approximately 160 km² located on NTS map sheet 1 K/14, northwest of Route 10 between Portugal Cove South and and Capahayden. The underlying fine-grained clastic sediments belong to the Conception Group of Hadrynian age, and Pb, Zn, and Co anomalies are indicated by lake sediment geochemistry. The survey also includes an area of 5 km², south of Fermeuse Harbour (on NTS map sheet 1 K/15), underlain by a sandstone-shale sequence of the Hadrynian St. John's Group. Samples were analyzed for Zn, Pb, Ni, Cu, Ag, Co, Cd, Fe, F, Mn, and L.O.I. This open file contains 8 single element maps (no F, or Ag), a loss-on-ignition map, 4 regression maps (residual Zn, Ni, Co, and Cd, after regression with Mn), a sample location map, and a brief report.

1 M (211) Tuach, J. 1984: *Tin Analyses of Whole Rock Samples from the Ackley Granite and Cross Hills Plutonic Complex, Grand Le Pierre Area, Newfoundland.* This open file consists of 149 tin analyses of granite and greisen samples collected from the Ackley Granite and Cross Hils Plutonic Complex. Most of the data are plitted on a 1:15 000 scale geological base map of the Grande Le Pierre-Sage Pond area. A data listing, sample number, tin analyses, sample station grid reference, and field description for all samples accompany the map.

1 M (214) Tauch, J. 1984: *Tungsten Analyses from Quartz Topaz Greisen Veins, and the Economic Significance of Lithogeochemical Trends in the Ackley Granite.* This open file reports tungsten assays from 30 samples of quartz-topaz greisen from the Ackely Granite (results of FRX 37 Multi Element Semi-Quantitative analyses on selected samples are included). Contoured major and trace element distribution maps summarizing lithogeochemical trends reported by Dickson (1983) and Davenport *et al.* (1984) are presented, and the economic significant of these trends is reviewed.

1 N (440) Meyer, J.R., Butler, A.M., and Davenport, P.H. 1983: *Avalon North (Stream Sediment Geochemistry).* The sampled area is located on the Avalon Peninsula. This survey covers approximately 150 km² located on NTS map sheets 1 N/11 and 1 N/14. The area is underlain mainly by thinly interbedded siltstone and black shale of the Hadrynian Carbonear Formation. A regional Zn anomaly is indicated by lake sediment geochemistry, along with Pb and Ag anomalies of lesser area extent. Samples were analyzed for Zn, Pb, Ni, Cu, Ag, Co, Cd, Fe, F, Mn, and L.O.I. This open file contains 9 single element maps (no F), a loss-on-ignition map, 4 regression maps (residual Zn, Ni, Co, and Cd, after regression with Mn), a sample location map, and a brief report.

1 N (450) Butler, A.J., Meyer, J.R., and Davenport, P.H. 1984: *Stream Sediment Geochemistry of the Harbour Grace Area, Avalon Peninsula, Newfoundland.* New data in this report were collected during the 1983 field season. Earlier data released as open file 1N (440) are also included. The open file includes 10 single element distribution maps (1 for each Cu, Pb, Zn, Co, Ni, Ag, Mn, Fe, F, and Cd), and L.O.I. (loss-on-ignition) maps, 4 residual metal maps (RZn, RCo, RNi, and RCd), and a sample location map. All are on a scale of 1:50 000 with a geology base. Accompanying these maps is a report containing a description of the field work and summary. A microfiche copy of the data listing is also included.

1 N (452) Howse, A.F., Butler, A.J., and Collins, C.J. 1984: *Stream Sediment Geochemistry of Part of the Bellevue Area (1 N 12), Avalon Peninsula, Newfoundland.* New data in this report were collected during the 1983 field season. The open file includes 14 single element distribution maps (1 for each of CU, Pb, Zn, Co, Ni, Ag, Mo, F, Ba, Sr, Mn, Fe, Cd, L.O.I. (loss-on-ignition) maps and a sample location map. All are on a scale of 1:50 000 with a geology base. Accompanying these maps is a report containing a description of the field work and summary. A microfiche copy of the data listing is also included.

2 D (142) Blackwood, R.F., Green, L., and Davenport, P.H. 1984: *This open file is a revised version of open file 2 D (127) containing major and trace element data for 101 samples from the Middle Ridge and Third Berry Hill Pond Granites.* In addition to the trace elements Li, Be, F, V, Cr, Ni, Cu, Zn, Sn, Rb, Sr, W, Ag, Mo, Ba, Pb, and U given in the earlier open file, data for Ga, Y, Zr, Nb, Th, Ce, and La are presented (the last 2 elements are semi-quantitative). The listings of field data and CIPW norms have been checked and revised where necessary. The open file consists of a data listing and a sample location map at 1:100 000 scale (Map 82-50, revised).

2 E/13 (483) Saunders, C.M. 1984: *Analyses of Mineral Samples from Betts Cove Area, Notre Dame Bay, Newfoundland.* Brief report plus tables. Analyses are for gold, silver, etc.

11 O/10 (147 Howse, A.F., and Collins, C.J. 1984: *An assessment of the Diamond Cove Quartz Vein, Rose Blance (N.T.S. 11 O/10), Newfoundland (includes a report plus tables and 1 map).*

11 O/9 (148) Swinden, H. Scott 1984: *The Chetwynd Prospect (N.T.S. 11 O/9), Southwestern Newfoundland.*

12 A (347) Sparkes, B.G. 1984: *Surficial and Glacial Geology, Central Newfoundland, Including Geochemistry of Till Samples for Victoria Lake (12 A/6), Snowshoe Pond (12 A/7), and Star Lake (12 A/11), Newfoundland.* This report presents the results of field work completed during 1978 to 1981. Aerial photograph interpretation of surficial landforms is presented as two 1:100 000 scale maps. Till geochemical data are presented as a series of single element maps for Cu, Pb, Zn, Co, Ni, Ag, Mn, Fe, V, and Mo. All are on a scale of 1:100 000 with a geology base. Sample locaton maps with till lithology data and glacial flow feature maps are also included. Accompanying these maps is a report containing a description of the field work and a discussion of the glacial geology.

Nfld. 1267 and Lab. 598 Environmental Geology Section 1983: *These open files consist of site maps and field maps from all surficial and glacial mapping and aggregate resource mapping project areas.* These are raw data in both note and map format available only on microfiche.

Nfld. 1300 and Lab. 607 Environmental Geology Section 1983: *These open file maps outline zones of potential for aggregate resources within a 6 km wide corridor along all transportation routes in Newfoundland and Labrador.* The maps also include the locations of pits and quarries as well as the locations and types of samples (sand, gravel, silt, clay, glacial till, rocks) collected during field surveys. The maps provide an index to geotechnical and other related data collected during field and laboratory testing (e.g. particle size analyses, lithologic analyses, petrographic numbers, landform and statigraphic data, etc.); these data are also available upon request. The map data are available on microfiche or on 1:50 000 scale blueline copies.

Nfld. (1315) Vanderveer, D.G. 1983: *Aggregate The Often Maligned and Often Forgotten Industrial Mineral,* 20p.

Nfld. (1316) Meyer, J.R., Butler, A.J., and Davenport, P.H. 1983: *Humber Arm North (Stream Sediment Geochemistry).* The sampled area is located northwest of Corner Brook, western Newfoundland. The survey covers approximately 175 km² between Middle Arm and Goose Arm to the north, and Humber Arm to the south, including parts of NTS sheets 12 A/13, 12 B/16, 12 G/1, and 12 H/4. The underlying sandstone-siltstone-shale sequence is part of the allochthonous Humber Arm Supergroup of Cambrian age. Lake sediment geochemistry indicates localized ZN, Pb, and Cu anomalies. Samples were analyzed for Zn, Pb, Ni, Cu, Ag, Co, Cd, Fe, F, Mn, and L.O.I. This open file contains 9 single element maps (no Ag), a loss-on-ignition map, 5 regression maps (residual Co and Ni after regression with Fe; residual Pb, Zn, and Cd after regression with Mn and L.O.I.), a sample location map, and a brief report.

Nfld. (1317) Dean, P.L., and Meyer, J.R. 1983: *Lithogeochemistry of Mid-Ordovician Cherts and Shales of Central Newfoundland, 1981.* This release presents the results of lithogeochemical sampling of Mid-Ordovician (Caradocian) cherts and shales of Central Newfoundland. Twenty-four sections were mapped in detail and 995 chip samples were collected from 1500 m of strata. Sample intervals were 3 m in unmineralized sections and 1 m in sections containing 1 or more intervals with an estimated 5% or greater sulphide mineralization. Continuous sampling was carried across massive banded sulphides. Sedimentological, structural, and paleonotological data were collected throughout the mapping program. All data have been coded and entered into computer files for comparison with the analytical results. All samples were anlayzed for Ba, V, Cu, Zn, Ni, Ag, Pb, Co, U, F, H_2O, S, Co_2, SiO_2, Al_2O_3, Fe (total), MgO, CaO, Na_2O, K_2O, TiO_2, MnO, P_2O_5, and L.O.I. This file consists of: a computer printout of all analytical and field data, basic statistics for each section and for the complete data set, descriptions and location maps for each section, and detailed litologic drafts for each section at a scale of 1:100.

Nfld. (1318) *Gamma Ray Spectrometry Survey South Coast, Newfoundland, 1983.* Airborne gamma-ray spectrometric survey results obtained by the Geological Survey of Canada are being released as the following Geolphysical Series Maps:

36611(9)G NTS 11 P/9 *Part of 1 M 12 Facheux Bay*
36611(10)G NTS 11 P/10 *La Hune*
36611(11G NTS P/11 *Ramea*
36611(14)G NTS 11 P/14 *White Bear River*
36611(15)G NTS 11 P/15 *Dolland Brook*
36611(16)G NTS 11 P/16, Part of 1 M/13 *D'Espoir Brook*
35112(1)G NTS 12 A/1, Part of 2 D/4 *Cold Spring Pond*
35112(2)G NTS 12 A/2 *Wolf Mountain*
35112(3)G NTS 12 A/13 *Burnt Pond*

Results are compiled at 1:50 000 scale as contour maps. Stacked profiles for each flight line are at 1:100 000 scale.

EXTERNAL PUBLICATIONS, 1983/84

Andrews, K., Mercer, N., Dean, P., Kipnis, N., and gibbons, R. 1983a: *Newfoundland and Labrador:* Promising Potential Recognized; Western Miner, 56(2), p.34-36.

1983b: *Newfoundland and Labrador Hurt by Recession.* Western Miner, 56(4), p.18-19.

Andrews, K., Mercer, N., and Gibbins, R. 1984a: *More Open Ground: Newfoundland Activity is Improving;* Northern Miner, 69(52), p.C8 C9.

1984b: *Mineral Exploration in Newfoundand and Labrador;* Western Miner, 57(2), p.44-47.

Boyce, W.D., Stouge, S., and Knight, I. 1983: *Major Early Ordovician (Late Tremadoc Early Arenig) Regression-Transgression, Iapetus Ocean;* **in** Evolution of the Ancient Continental Margin of Western Newfoundland, Program with Abstracts, Geological Association of Canada (Newfoundland Section), Annual Meeting.

Colman-Sadd, S.P., and Swinden, H.S. In Press: *A Tectonic Window in Central Newfoundland? Geological Evidence that the Appalachian Dunnage Zone May Be Allochthonous;* Canadian Journal of Earth Sciences, Volume 21.

Dallmeyer, R.D., Hussey, E.M., O'Brien, S.J., and O'Driscol, C.F. 1983: *Chronology of Tectonothermal Activity in the Western Avalon Zone of the Newfoundland Appalachians;* Canadian Journal of Earth Sciences, Volume 20, p.355-363.

Dallmeyer, R.D., Kean, B.F., Odom, A.L., and Jayasinghe, N.R. 1983: *Age and Contact Metamorphic Effects of the Overflow Pond Granite: An Undeformed Pluton in the Dunnage Zone of the Newfoundland Appalachians; Canadian Journal of Earth Sciences, Volume 20, p.1639-1645.*

Davenport, P.H. 1984: "Black Smokers" and Regional Geochemical Disperson Patterns in the Central Volcanic Belt of Newfoundand; **in** Volcanoes and Their Ores: Colcanogenic Mineralization in Newfoundland, Program with Abstracts, Geological Association of Canada (Newfoundland Branch), Annual Meeting, St. John's.

Dawe, R. 1983: *Newfoundland Optimistic over Diamond Drilling;* Northern Miner, 68(52), p.C3-C4.

Dean, P.L. 1984a: *Industrial Minerals in Newfoundland and Labrador;* Industrial Minerals, 200, May 1984.

1984b: *Volcanogenic Mineralization in Newfoundland and Labrador: An Overview;* **in** Volcanoes and Their Ores: Volcanogenic Mineralization in Newfoundland, Program with Abstracts, Geological Association of Canada (Newfoundland Branch), Annual Meeting, St. John's.

Gower, C.F., Crocket, J.H., and Kabir, A. 1983: *Petrogenesis of Archean Granitoid Plutons from the Kenora Area, English River Subprovince, Northwest Ontario, Canada;* Precambrian Research, Volume 22, p.245-270.

Gower, C.F., and Owen, V. 1984a: *Pre-Grenvillian and Grenvillian Lithotectonic Regions in Eastern Labrador Correlations with the Sveconorwegian Orogenic Belt in Sweden;* Canadian Journal of Earth Sciences, Volume 21, p.678-693.

1984b: *The Grenville Province in Eastern Labrador Correlations with the Sveconorweigan Orogenic Belt in Sweden; Geological Association of Canada, Program with Abstracts, Annual Meeting, London, Ontario, 9, p.68.*

Hill, J.D., and Thomas, A. 1983: Correlation of Two Helikian Peralkaline Granite-Volcanic Centres in Central Labrador; Canadian Journal of Earth Sciences, Volume 20, p.753-763.

Hyde, R.S., and Knight, I. 1983: *Stratigraphic and Tectonic Evolution of Carboniferous Basins in Western Newfoundland;* **in** Evolution of the Ancient Continental Margin of Western Newfoundland, Program with Abstracts, Geological Association of Canada (Newfoundland Section), Annual Meeting.

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Knight, I. 1983: *Middle and Upper Cambrian Platform Carbonates, Western Newfoundland;* **in** Evolution of the Ancient Continental Margin of Western Newfoundland, Program with Abstracts, Geological Association of Canada (Newfoundland Section), Annual Meeting.

Krogh, T., and Wardle, R. 1984: *U-Pb Isotopic Ages Along the Grenville Front;* Geological Association of Canada, Program with Abstracts, Annual Meeting, London, Ontario, 9, p.80.

Longstaffe, F.J., and Gower, C.F. 1983: *Oxygen Isotope Geochemistry of Archean Granitoid Gneisses and Related Rocks in the English River Subprovince, Northwestern Ontario;* Precambrian Research, Volume 22, p.203 218.

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Rivers, C.T.E., and Nunn, G.A.G. 1983: *Grenvillian Reworking of Lower Proterozoic Basement Rocks in Central and Western Labrador;* Geological Association of Canada, Program with Abstracts, Annual Meeting, Victoria, B.C., 8, p.A58.

Stephens, M.B., Swinden, H.S., and Slack, J.F. 1983: *Correlation of Massive Sulphide Deposits in the Caledonian-Appalachian Orogen on the Basis of Paloetectonic Setting; I.G.C.P. Project 60, Symposium on Stratabound Sulfides of the Appalachian-Caledonian Orogen, Ottawa, Program and Abstracts, p.28.*

In Press: Correlation of Massive Sulfide Deposits in the Caledonian-Appalachian Orogen on the Basis of Paleotectonic Setting; Economic Geology, 79(7).

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Swinden, H.S. 1984a: *Geological Setting and Volcanogenic Massive Sulphide Mineralization of the Eastern Wild Bight Group, North-Central Newfoundland;* p.513-519 **in** Current Research, Part A, Geological Survey of Canada, Paper 84-1A.

1984b: *An Overview of Volcanogenic Massive Sulphide Mineralization in the Appalachian-Caledonian Orogen;* **in** Volcanoes and Their Ores: Volcanogenic Mineralization in Newfoundland, Program with Abstracts, Geological Association of Canada (Newfoundland Branch), Annual Meeting, St. John's.

Swinden, H.S., and Thorpe, R.I. 1983: *Variations in Style of Volcanism and Massive Sulfide Deposition in Early-Middle Ordovician Island Arc Sequences of the Newfoundland Central Mobile Belt;* I.G.C.P. Project 60, Symposium on Stratabound Sulfides of the Appalachian-Caledonian Orogen, Ottawa, Program and Abstracts, p.31.

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Thomas, A. 1984: *Some Unique Major and Trace Element Characteristics Which Aid in the Identification and Classification of Peralkaline Rocks;* **in** Volcanoes and Their Ores: Volcanogenic Mineralization in Newfoundland, Program with Abstracts, Geological Association of Canada (Newfoundland Branch), Annual Meeting, St. John's.

Thomas, A., Nunn, G.A.C., and Krogh, T. 1984: *Recent Geological and Geochronological Data, North-Central Margin of the Grenville Province in Labrador;* Geological Association of Canada, Program with Abstracts, Annual Meeting, London, Ontario, 9, p.111.

Vanderveer, D.G. 1983: *Aggregates — The Often Maligned and Forgotten Industrial Mineral;* p.65-78 **in** 19th Forum on Geology of Industrial Minerals, Proceedings, edited by S.E. Yundt, Ontario Geological Survey, Miscellaneous Paper 114, 216p.

Wardle, R.J. 1983: *Tectonic Evolution of the Nain-Churchill Province Boundary, Nachvak Fiord, Labrador;* Geological Association of Canada, Program with Abstracts, Annual Meeting, Victoria, B.C., 8, p.A72.

Wardle, R.J., and Rivers, T. 1984: *A New Look at the Eastern Grenville Province of Labrador – Eastern Quebec;* Geological Association of Canada, Program with Abstracts, Annual Meeting, London, Ontario, 9, p.115.

NORTHWEST TERRITORIES

PUBLICATIONS

In 1984, the Mineral Industry Report for 1980 and 1981 (EGS 1984-5) and the first volume of a new series *"Contributions to the Geology of the Northwest Territories"* (EGS 1984-6) were purblished as were preliminary reports or maps as follows:

Proposed Mineral Exploration Activity, District of Deewatin, Scale 1:1 000 000; P.J. Laporte (EGS 1984-1).

Index to Geological, *Geochemical and Surficial Geology Reports, Keewatin District;* P.J. Laporte (EGS 1984-2).

Preliminary Geological Map of Rutledge Lake, NTS 75E/10, Scale 1:31 680; N.G. Culshaw (EGS 1984-3).

Mackay-Courageous Lake Volcanic Belt (NTS 75 M/15 and 76 D/2); C.H. Dillon-Leitch (EGS 1984-4).

In preparation for release in 1984 are geological maps of the Dismal and Hornby Bay areas (parts of NTS 86 J; 86 K), Sito Lake area (part of NTS 85 J/16), Anialik River-Grays Bay Area (NTS 76 M/11 and 14 SI/4) and maps for parts of the Nonacho Basin (75 C-F and K) and the Ellington Lake area (part of NTS 86 F/3).

These maps and reports are avilable for purchase from the Gology Division, NAP, Box 1500, Yellowknife. Examination copies are provided to most Geological Survey of Canada and Department of Indian and Northern Affairs libraries.

YUKON TERRITORY

LIST OF PUBLICATIONS, 1983/84

Debicki, R.L. 1983: *Yukon Placer Mining Industry, 1978-82;* Exploration and Geological Services Division, Yukon, Indian and Northern Affiars Canada, 203p.

1984: *Bedrock Geology and Mineralization of the Klondike Area (WEST), 115 O 14, 15 and 116 B 2, 3;* Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, Open File, 1:50 000 scale map with marginal notes.

Morison, S.R. 1983: *Surficial Geology of Clear Creek Drainage Basins, 115 P NW;* Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, Open File, 1:50 000 scale map and legend.

Watson, P.H. 1984: *The Whitehorse Copper Belt — A Compilation; Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, Open File, 1:25 000 scale map with marginal notes.*

Indian and Northern Affairs, Canada 1983: Yukon Exploration and Geology 1982; Exploration and Geological Services Division, Yukon, 259p. This volume contains the following papers and summaries of exploration work conducted in Yukon during 1982:

Abbot, J.G. 1983: *Origin of the Clinton Creek Asbestos Deposit,* p.18-25.

Emond, Diane S. 1982: *Geology of the EPD Stanniferous Deposit, McQuesten Area,* 115 P Yukon.

Lowey, Grant 1982: *Report of 1982 Field Work on Early Tertiary Clastics, West-Central Yukon.*

Lynch, Gregory V., Pride, Calvin, and Watson, Pat 1982: *Petrology and Geochemistry of the Pattison Alaskite Pluton.*

Morin, J.A., Grapes, K.J., and Debicki, R.L. 1983: Yukon Mineral Industry 1982, An Overview, p.4-7.

Morison, S.R. 1982: *A Sedimentologic Description of Clear Creek Fluviate Sediments, 115 P, Central Yukon.*

Reid, Pamela, and O'Brien, Jennifer 1982: *Upper Triassic Rocks at Hill 4308, LaBerge Map Area,* 105 E Yukon.

Roots, D.F., and Moore, Jr., John M. 1982: *Proterozoic and Early Paleozoic Volcanism in the Ogilvie Mountains:* An Example from Mount Harper, West-Central Yukon.

Smith, M.J. 1982: *The Skukum Volcanic Complex, 105 D SW;* Geology and Comparison to the Bennett Lake Cauldron Complex.

Vaillancourt, P. 1982: Geology of Pyrite-Sphalerite-Galena Concentrations in Proterozoic Quartzite at Quartz Lake, Southeastern Yukon.

ABSTRACT OF PAPER PRESENTED AT CONFERENCE

Abbott, J.G., Gordey, S.P., and Tempelman-Kluit, D.J. 1983: *Regional Setting of Paleozoic Sediment-Hosted Stratiform Lead-Zinc Deposits in Yukon and Northeastern British Columbia;* Abstract, p.10 in Geology Division CIM, D.I.A.N.D. — Yukon and MDD, GAC Joint Symposium, Mineral Deposits of Northern Cordillera, Program, Whitehorse.

ANNUAL REVIEWS OF ACTIVITIES
PROVINCIAL AND FEDERAL GEOSCIENTIFIC ORGANIZATIONS

Province or Territory Location	Date (s) (No. of Days)	Time for Talks	Universities Involved?	Industry Involved?	Poster Session	Universities Involved?	Industry Involved?	Publication	[1]Energy Matters	[2]Other Topics	Comments
British Columbia Vancouver	24 Jan. 1985 (1 of 3)	1 day	No	Yes B.C. & Yukon Chamber Annual Meeting	Yes	No	No	Yes Geological Fieldwork	Yes Coal, Geo-thermal	Yes	held biennially; 3 related days Jan. 23 - GSC Jan. 24 - BCEMPR Jan. 25 - BCYCM; DIAND - Yukon
Yukon Territory Whitehorse (DIAND)	21 Jan. 85 Whitehorse (1)	0.5 days	No	No	Yes	No	No	No	No	No	Includes majority of papers given at Vancouver meeting
	25 Jan. 85 (PM) Vancouver (1 of 3)	0.5 days	Yes	No	Yes (3 after-noons)	Yes	No	No	No	No	Part of "Cordilleran Geology and Exploration Round-Up" with BCEMPR and BC-YCM
Northwest Territories Yellowknife (DIAND)	4,5,6 Dec. 84 (3)	3 days	Yes	Yes	Concurrent	Yes	Yes	Yes	Coal only	as required	organized with NWT Chamber of Mines GSC involved
Alberta Edmonton	22 Nov. 84 (1)	1 day	No	No	Yes	Yes	No	Ann Rept of Investigations	Yes	No	No held biennially
Saskatchewan Regina	14 Nov. 84 (1)	0.5 days	Yes	No	0.5 days	Yes	No	Rept. of Activities	Yes	No	Sask. Research Council involved, talks and poster displays
Manitoba Winnipeg	15 Nov. 84 (1)	0.5 days	Yes	No	1 day	Yes	No	Rept. of Activities	No	No	GSC involved; indepth talks in p.m.
Ontario Toronto	4,5 Dec. 84 (2)	2 days	Yes	Yes	Concurrent	Yes	Yes	3 Repts. of Activities	Yes	Yes	research oriented; special symposium
Quebec Quebec City	28,29 Nov. 84 (2)	2 half days	Yes	Yes	2 half days	Yes	No	Rept. of Activities	No	No	Theme: Geology & Metal-logeny, Labrador Trough, Gaspe Peninsula
New Brunswick Fredericton	27 Nov. 84 (1)	0.5 days	No	No	0.5 days	Yes	No	Yes (1984 Project *Resumes*)	Yes	Yes	GSC involved
Nova Scotia Halifax	28,29 Nov. 84 (1.5)	1 day	Yes	No	0.5 days	Yes	No	Yes Publication	Yes	Yes	GSC involved
Newfoundland St. John's	1 Nov. 84 (1)	0.5 days	Yes	No	0.5 days	Yes	No	Yes	No	Yes	GSC involved
Prince Edward Island	NO OPEN HOUSE										
Geological Surv. Can. Ottawa	23,24 Jan. 85 (2)	2 days	Yes	No	Concurrent	Yes	Yes	Yes (Current Research)	Yes	Yes	Provincial agencies Cooperative Programs
Bedford Inst. Ocean. Dartmouth	30May-3June 84 (5)	short talks	No	No	Public Displays	No	No	No	Yes	Yes	

[1]Energy Matters: (e.g. oil, gas, coal, oil shales, peat) [2]Other Topics: (e.g. administration, engineering, regulations, legislation, etc.)

TABLES SUMMARIZING MINING RIGHT LEGISLATION IN THE PROVINCES AND TERRITORIES

Mining rights (dispositions) are the legal vehicles through which the owners of the minerals, the Provinces and Canada, grant to the public exclusive rights to search for, develop and mine those minerals.

Figures 1 to 5 are tables of data that summarize selected elements of mining right legislation in the ten provinces and two territories. Elements selected are those that deal with obtaining and maintaining a mining right.

Figures 1, 2 and 3 contain the raw data as specified in each provincial and territorial piece of legislation. The data is organized under the three stages of progression of a mineral showing to a producing mine, i.e. exploration, development and production, with some overlap. These three stages are correlated with the advancing levels of mining rights, as follows:

STAGE	MINING RIGHT
1. exploration and development	claim
2. development and pre-production	early lease (licence in eastern provinces) — production not a condition of the lease
3. production	late lease (lease in eastern provinces) — production generally a condition of the lease

Because of varying claim sizes and use of both Imperial and metric measure, Figures 1 to 3 have limitations in their usefulness for comparisons between jurisdictions, especially with respect to required work and fees. Thus, Figures 4 and 5 have been constructed to provide for direct comparison of these two elements. Part A of Figure 4 repeats the raw data for required work while Part B shows the same data mathematically averaged, based on a 40 acre (16 ha) claim. In Figure 5, the fees for recording and renewing claims are also converted to a 40 acre (16 ha) claim size and licence and lease rentals are expressed as $ per ha per year.

The reader is advised that, because of the on-going process of amendment to legislation, some data may be obsolete by the time of publication of these tables. The reader is also cautioned that these tables are not a substitute for actual legislation nor should they be used as such.

In order to accomplish completeness of data in a convenient size, it is necessary to make considerable use of the following abbreviations and symbols:

ft	feet	L	length
m	metres	W	width
ac	acres	⩾	not greater than
ha	hectares	max	maximum
t	tonnes	min	minimum
mos	months	ug	underground
yr(s)	year(s)		

Figure 1 — Exploration and development

		YUKON	N.W.T.	B.C.	ALBERTA	SASKATCHEWAN
Enacted (last amend)		1952 (1967)	1977 (1979)	1977 (1982)	1981 draft	1961
Ground/map staking		ground	ground	ground	map	ground
Basic claim	**Name**	mineral claim	claim	(a) mineral claim of 1 to 20 units (b) 2-post claim (by indiv. only)	metallic mineral exploration permit	mineral claim
	How staked	2 posts, line between marked, max 8 claims/yr within 8 mi. rad.	4 corner posts and at 1500 ft on ext bndry, bndry marked before recording	(a) legal corner post & at 500 m on ext bndry, bndry marked (b) 2 posts, line between marked	public tender or application (map selection)	(a) surv. area: legal subd'n (b) unsurv. area: 4 corner posts, bndry marked
	Size	L ≯ 1500 ft W ≯ 1500 ft 51.65 ac (20.9 ha)	≯ 2582.5 ac (=50 @ 1500 ft), sides are mult. of 1500 ft, L ≯ 5W	(a) unit: 500 m (25 ha) (b) 2-post claim: 457.2 m (1500 ft) 20.9 ha (51.65 ac)	16 to 18,500 ha W ≯ 400 m L ≯ 5W	(a) 40 ac (b) ≯ 40 ac side≯ 1980 ft
Block	**Size**	—		25 to 500 ha ≯ 8 units in one direction		L ≯ 6W (a) 1½ to 24 sect. (b) 960 to 15,360 ac
Bearing of boundaries		any	astronomic	(a) astronomic (b) any	astronomic	astronomic
Time marked on no. 1 post		date only	placing of post & compl'n of claim	(a) commencement & completion (b) date only	—	claim: commenc't block: completion
Max. time to affix tags		as soon as reas. poss. after recording	when staking (write on tags)	when staking (write on tags)	—	1 yr from recording
Max days to record		15 + extra dep. on distance	60	30	—	(a) — (b) 30
Recording fee ($)		10/claim	0.10/ac	5/unit	25/permit	5/claim 0.15/ac for block
Term length x number		1 yr x unlim.	2 yrs plus 1 yr x 8	1 yr x unlim.	2 yrs plus 1 yr x 3	1 yr x 10
Renewal fee ($) ***Filing work**		• 5/claim	* 0.10/ac	* 5/100 work	0	0
Annual work $/claim unless otherwise specif.		100	yrs(1+2) $4/ac 3+ $2/ac	yrs 1-3 100/unit 4+ 200/unit	yrs (1+2) $10/ha 3-5 $5/ha	claim: yrs 2-10 100 block: yrs 2-10 $2.50/ac
Cash for work — Refund if work done		yes - no	yes - yes	yes - no	yes - no	yes - no
Limit for grouping work		16 claims/yr	5165 ac/yr (=100 @ 1500 ft)	100 claims/yr	18,500 ha/term	36 contiguous claims/yr
Limit for excess work credit		$400/cl/yr	unlim.	10 yrs.	unlim.	unlim.
Time after anniv. To file work rpts		6 mos (fee after 14 days)	30 days	30 days (fee)	none	90 days
Confidential period for work reports		lapse + 6 mos	upon lapse or 3 yrs	1 yr	1 yr after permit expires, 5 yrs after if leased	none with consent or upon lapse or 6 yrs
Prod'n permitted		yes	≯ $100,000/yr	if surveyed or ≯ 1000 t/yr	no	no
Other exploration rights		—	permit to prospect	reverted Crown-granted claim	agreement	permit, agreement

MANITOBA	ONTARIO	QUEBEC	N.B.	N.S.	P.E.I.	NFLD.
1975 (1981)	1960	1965 (1982)	1962 (1981)	1975	1978	1977 (1983)
ground	ground	ground	ground	map	map	(a) ground (b) map
mining claim	mining claim	claim development licence after yr 1 (yr 2 N of 52°)	mining claim	claim exploration licence for 1 to 80 claims	claim exploration licence for 1 to 80 claims	mineral claim
(a) surv. area: 1+ leg. subd'ns (b) unsurv. area: 4 corner posts and at 400 m on bndry, bndry marked	4 corner posts, bndry marked	4 corner posts, bndry marked, special rules in surv. area	4 corner posts in clockwise order, bndry marked	map selection	map selection	(a) 4 corner posts, bndry marked (b) map selection
16 to 256 ha L ≯ 4W side ≯ 400 m	(a) 1320 ft (40 ac) (b) aliquot part of subdivided lot	400 m (16 ha) in unsurv. area, other sizes in surv. area	400 m (16 ha)	40 to 3200 ac	40 to 3200 ac	(a) 400 m (16 ha) (b) 500 m (25 ha)
	—	dev. lic. ≯ 90 ha	—			(a) 16 to 64 claims (256 to 1024 ha) L ≯ 4W
astronomic	astronomic	astronomic	magnetic	astronomic	astronomic	astronomic
completion	commencement (compl'n proposed)	commencement	commencement	—	—	completion
at staking if pre- purch., 1 yr from rec'ding if purch. at rec'ding	6 mos. from recording	when staking	3 mos. from recording	—	—	during staking
30	31	15 + max 30 extra dep. on distance	30	—	—	30
5/claim	10/claim	0	4/claim	2/claim	5/claim	5/claim
2 yrs plus 1 yr x unlim.	1 yr x 5	cl. - 1 yr, 2 N of 52 lic. - 1 yr x unlim.	1 yr x 4	1 yr x 5	1 yr x 5	1 yr x 5
* 2/claim	0	.60/ha	2/claim	2/claim	5/claim	—
yrs 2-10 $12.50/ha 11+ $25.00/ha	yrs 1 20 days 2-4 40 days 5 60 days	yr 1 $5/ha 2+ $10/ha N of 52° yrs (1+2) $15/ha	25 days/yr (day = $5)	10 days/yr (day = $20)	$5/ac	yr 1 (a)200 (b)300 2 250 375 3 300 450 4 350 525 5 400 600
yes - yes	no	yes - no	any yr: yes - Yes yr 1: $10 - no	any yr: yes - yes yr 1: $40 - no	yes - yes	no but ext'n up to 1 yr with deposit
1600 ha/yr	4000 days/appl'n (more for drilling)	480 ha	contiguous claims	an expl. licence (80 claims)	an expl. licence (80 claims)	contiguous claims
unlim.	unlim.	unlim.	10 yrs.	unlim.	unlim.	unlim.
60 days	10 days	30 days	10 days	15 days	15 days	60 days
none with consent or upon lapse	none	discretionary on request	none (2 yrs for reg'l work on request)	2 yrs	2 yrs plus 1 yr on request	upon lapse or 3 yrs
no (without consent)	no	no	no	no	no	no
permit agreement	agreement	exploration permit in New Quebec	agreement	agreement	agreement	reserved area licence

Figure 1. Stage 1 — Exploration and Development

Figure 2 — Development and pre-production (production not a condition)

	YUKON	N.W.T.	B.C.	ALBERTA	SASKATCHEWAN
NAME	lease (of claim)	–	mining lease	lease (1st & 2nd terms)	(a) lease (b) developed area (by expenditures)
Boundary survey	yes	–	yes	no	(a) marked or surveyed
Other conditions for obtaining	certif. of improvements ($500 spent, min. dep. found, post notice)	–	post & publish notice of intent	economic mineral deposit	(b) $100/ac spent, min $50,000 ug
Size limits	1 claim	–	max 40 units or 2-post claims	min 16 ha	(a) none (b) max 1440 ac
Term, renewal cond'ns	21 yrs, renewable if satisfy Min. that cond'ns of lease complied with	–	max 21 yrs, renewable indef.	15 yrs, renewable once without prod'n	(a) max 21 yrs renewable indef. (b) as per dis'p'n
Rent (ann. unless otherwise spec.)	$50/1st term $200/2nd term	–	0	$2.50/ha less 50% of am't spent on work	(a) 0 (b) $1/ac, min $200
Annual work	none	–	$400/unit or 2-post claim		(a) $5/ac (b) none

MANITOBA	ONTARIO	QUEBEC	N.B.	N.S.	P.E.I.	NFLD.
lease (1st & 2nd terms)	lease (of mining rights)	development licence (continued)	mining licence	development licence	development licence	extended licence
yes – unsurv. area ? – surv. area	yes – unsurv. area ? – surv. area	no	yes	no	no	no
$625/ha spent, lesser am't subj, to geol. & econ.		see Stage 1		suff. work to prove up a min'l deposit	suff. work to prove up a min'l deposit	compliance with terms of initial licence
max 800 ha L ≯ 6W	none	max 90 ha	none	max 80 claims	max 80 claims	none
21 yrs, renew once without prod'n if $1250 spent or prod'n on adj. lease or fully explored or prod'n unwarr.	21 yrs renewable indef.	1 yr renewable indef.	1 yr renewable indef.	1yr renewable indef.	1 yr renewable indef.	one term max 5 yrs
$7.50/ha, min $80	term 1, yr 1 $1/ac yrs 2+ .25/ac terms 2+ .50/ac	$.60/ha	$.62/ha	$1/ac	$1/ac	$3/ha
none, unless needed for renewal	none	$10/ha	25 days/16 ha (day – $5)	as prescribed by Minister	as prescribed by Minister	$600/claim

Figure 3 — Production (production generally a condition)

	YUKON	N.W.T.	B.C.	ALBERTA	SASKATCHEWAN	MANITOBA
NAME	lease (3rd term +)	lease (of claim)	certified mining lease	lease (3rd term +)	developed area (by production)	lease (3rd term +)
Boundary Survey	yes (done in stage 2)	yes	yes (done in stage 2)	no	no	yes (done in stage 2)
Other conditions for obtaining	as prescr. by Gov. in Council	$10/ac spent ($4 tren, strip, drill, ug); undertake to commence prod'n	in production	prod'n for 7 yrs in 1st & 2nd terms	mandatory if in commerc'l prod'n	mining or on standby
Size limits	1 claim (per stage 2)	1 claim (max. 2582.5 ac)	max 40 units or 2-post claims (per stage 2)	min 16 ha	max 1440 ac	max 800 ha L ⊁ 6W (per stage 2)
Term, renewal cond'ns	21 yrs, renewable indef. per cond'ns prescr. by Gov. in Council	21 yrs, renewable indef. subj. to prescr. condn's	to 21 yrs, renew. indef., decert'd upon appl'n by lessee if prod'n ceases	15 yrs, renewable if in prod'n for 7 yrs prev. term	to 21 yrs, renew. indef. as long as in prod'n treat ore in Sask.	21 yrs, renewable indef. if in prod'n or on standby, treat ore in Canada
Rent (ann. unless otherwise spec.)	$200/term	$1/ac less red'n to 50% for tren, strip, drill, ug	$10/ha	$2.50/ha less 50% of am't spent on work	$1/ac, min $200	$5/ha, min $80
Annual work	none		none		none	none

	ONTARIO	QUEBEC	N.B.	N.S.	P.E.I.	NFLD.
	patent (= grant)	mining lease	mining lease	mining lease	mining lease	mining lease
	yes — unsurv. area ? — surv. area	yes — unsurv. area ? — surv. area	yes	yes	yes	yes if ground-staked
	1 yr continuous prod'n	reas. indic'n of economic min. dep., prod'n within 2 yrs	plans for mining & reclam'n	prod'n, plans for mining & reclam'n	prod'n, plans for mining & reclam'n	prod'n within 5 yrs
	none	max 90 ha/yr granted (to 400/yr with gov. appr'l)	min — 1 claim max — none	min — 1 claim max — 16 claims	max 12 claims	none
	grant in fee simple, treat ore in Canada	1st - 5 to 20 yrs; 3 ren'ls to 10 yrs each if mining 1/10 prev. term; extension possible	21 yrs, renewable to 84 yrs	20 yrs, renewable so long as mine operated	20 yrs, renewable so long as mine operated	1st - to 25 yrs, renewable for terms to 10 yrs each if shutdown ⊁ 5 yrs prev. term
	—	$2.50/ha	$2.47/ha	$1/ac	$1/ac	$40/ha
	—	none	25 days/16 ha (day = $5)	work or mining or both	work or mining or both	none

Figure 4. Summary of required work, years 1 to 10

	YUKON	N.W.T.	B.C.	ALBERTA	SASK.	MANITOBA	ONTARIO	QUEBEC	N.B.	N.S.	P.E.I.	NFLD.
Max. claim life	unlim.	10 yrs	unlim.	5 yrs	10 yrs	unlim.	5 yrs	unlim.	4 yrs	5 yrs	5 yrs	10 yrs
Basic claim size	51.65 ac	var'ble	25 ha	var'ble	40 ac	var'ble	40 ac	16 ha	16 ha	40 ac	40 ac	16 ha[4]

PART A

Required work-as prescribed	YR 1	100	$4/ac	100	$10/ha	0	0	20 days	$5/ha	125	200	$5/ac	200
	2	100		100		100	$12.50/ha	40 days	10/ha	125	200	5/ac	250
	3	100	2/ac	100	5/ha	100	12.50/ha	40 days	10/ha	125	200	5/ac	300
	4	100	2/ac	200	5/ha	100	12.50/ha	40 days	10/ha	125	200	5/ac	350
$/claim unless otherwise spec.	5	100	2/ac	200	5/ha	100	12.50/ha	60 days	10/ha	125	200	5/ac	400
	6-10 per yr	100	2/ac	200	2.50/ha[1]	100	12.50/ha	0[1]	10/ha	125[1]	200[3]	5/ac[3]	600

PART B **AVERAGE**

Required work-converted to $/40 ac or 16 ha	YR 1	77.5	80	64	80	0	0	200[2]	80	125	200	200	200	108.9
	2	77.5	80	64	80	100	200	300[2]	160	125	200	200	250	153.0
	3	77.5	80	64	80	100	200	400[2]	160	125	200	200	300	165.5
	4	77.5	80	128	80	100	200	500[2]	160	125	200	200	350	183.4
	5	77.5	80	128	80	100	200	600[2]	160	125	200	200	400	195.9
	6-10 per yr	77.5	80	128	40	100	200	600[2]	160	125	200[3]	200[3]	600	209.2
AVERAGE, YRS 1-10		77.5	80	108.8	60	100	180	500[2]	152	125	200[3]	200[3]	450	186.1

1. Where maximum claim life exceeded, required work for next stage is used.
2. As proposed in Discussion Paper, Ontario Ministry of Natural Resources, 1982.
3. Estimated (not specified in legislation).
4. Ground staked claim.

Figure 5. SUMMARY OF FEES

		YUKON	N.W.T.[1]	B.C.[1]	ALTA.[1]	SASK.	MAN.[1]	ONT.	QUE.	N.B.	N.S.	P.E.I.	NFLD.	AVERAGE
Individual Prosp. Licence $/yr		–	5.00	25.00	–	–	–	5.00	10.00	10.00	–	–	–	11.00
Corporate Prosp. Licence $/yr		–	50.00	500.00	–	–	–	25,50, 100	–	25,50, 100	–	–	–	150 to 187.50
Set of claims tags $/claim		0	1.00	2.00	–	1.00	2.00	0	0	1.00	–	–	2.00	1.00
$ per 40 ac or 16 ha	Record grnd. claim (unit)	7.77	4.00	3.20	–	5.00	.625	10.00	0	4.00	–	–	5.00	4.40
	Grant map permit (lic.)	–	–	–	.48 min 50	–	–	–	–	–	2.00	5.00	4.80	3.89 2.97
	Renew grnd. claim (unit)	0	0	0	–	0	0	0	9.60	2.00	–	–	–	–
	Renew map permit (lic.)	–	–	–	0	–	–	–	–	–	2.00	5.00	0	– 2.65
	File work	3.87	4.00	4.48 5 yr av.	.64 7 yr av.	0	.25	0	0	0	0	0	0	–
Rent: licence or lease $/ha/yr	non-prod.	.28 tms 1&2	–	0	2.50	(a) 0 (b) 2.47	7.50 tms 1&2	.97 tms 1&2	.60	.62	2.47	2.47	3.00	2.08
	prod.	.46 tms 3+	2.47	10.00	2.50	2.47	5.00 tms 3+	– (grant)	2.50	2.47	2.47	2.47	40.00	6.62

1. In these jurisdictions a claim (permit, licence) ranges in size. The middle of the range is used where appropriate.

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