CANADA

DEPARTMENT OF ENERGY,

MINES AND RESOURCES

GEOLOGICAL SURVEY OF CANADA

ANNUAL REPORT

APRIL 1, 1982 TO MARCH 31, 1983

FOR DEPARTMENTAL USE ONLY

OTTAWA

1983

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GEOLOGICAL SURVEY OF CANADA

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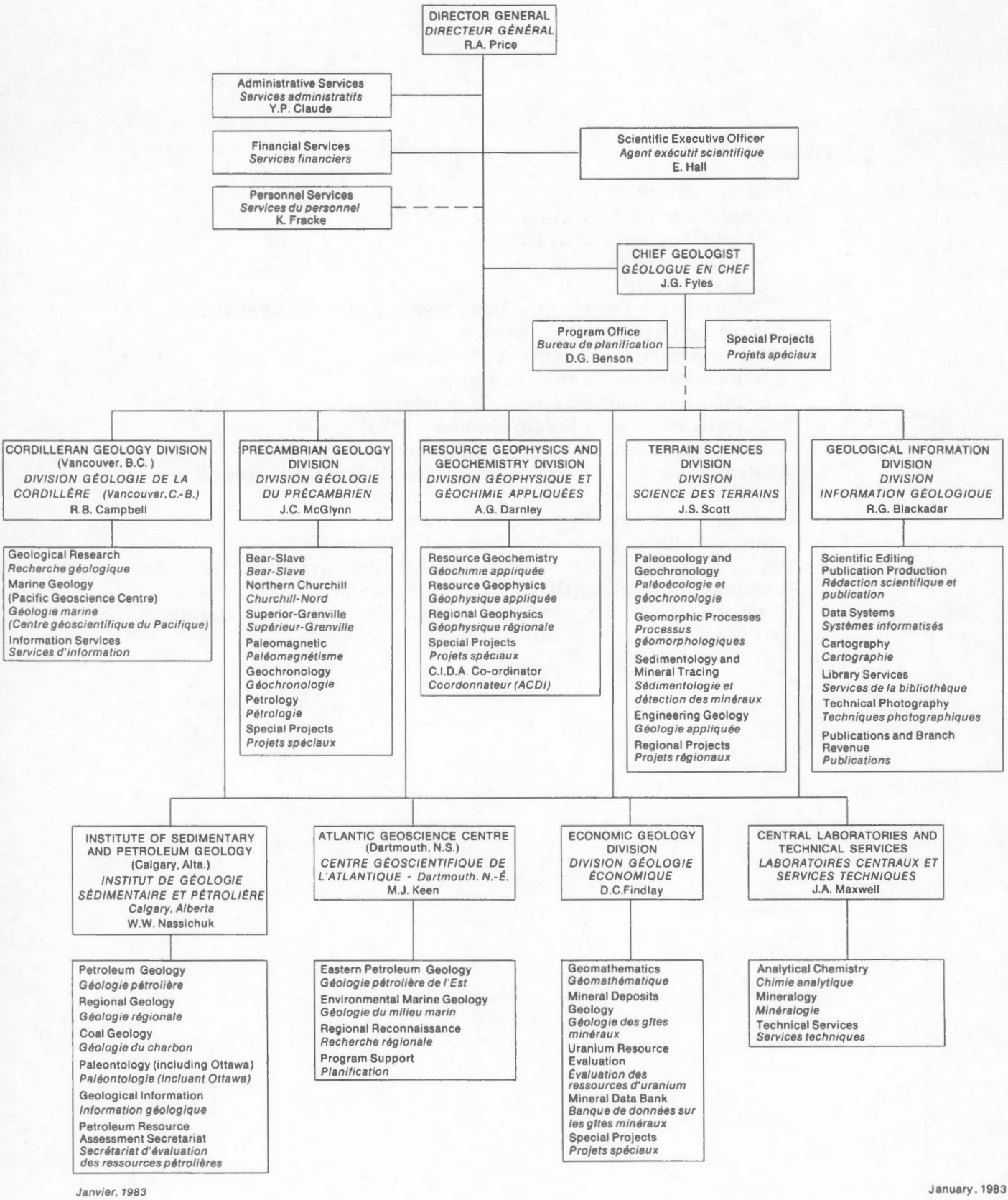
CONTENTS

GEOLOGICAL SURVEY OF CANADA
COMMISSION GÉOLOGIQUE DU CANADA



Janvier, 1983

January, 1983

PROGRAM STRUCTURE

During 1982-83 the Geological Survey of Canada continued to function within the Earth Sciences Sector of the Minerals and Earth Sciences Program.

The Geological Survey's activity continued to comprise ten sub-activities, conducted by the nine divisions of GSC and the branch headquarters. Resources utilized during the year are as follows:

	Resources*	
Sub-Activity (Division)	P.Y.	$000
Cordilleran Geology	46.2	3,117
Sedimentary & Petroleum Geology	152.0	8,853
Precambrian Geology	73.5	4,583
Atlantic Geoscience	104.9	9,580
Terrain Sciences	65.9	4,241
Economic Geology	48.7	2,522
Resource Geophysics & Geochemistry	97.4	7,052
Geological Information	95.6	3,717
Central Laboratories & Technical Services	46.4	1,855
Activity Management & Support (Branch HQ)	44.3	5,024
Total	774.9	50,544

*as of May 31, 1983. Totals include funds received from other Departments.

The following major items are included in the expenditures above:

	$ 000's
Energy Research and Development	3,108
Atomic Energy of Canada Limited	986
Nova Scotia Minerals Program	744
Newfoundland Minerals Program	1,331
Earth Physics - Geothermal Energy R&D	240
Georges Bank Project	2,370
	8,779

The summer program of the Geological Survey was enhanced by 109 students provided with person-years by the Summer Canada program.

OFFICE OF THE DIRECTOR GENERAL

Dr. R.A. Price served as Director General throughout the fiscal year, having been appointed at the beginning of January 1982. During the summer, Mr. A.M. Kelly stepped down as Chief Program Officer to take a research posting with CCRS, and was succeeded by Dr. D.G. Benson. Also during the summer, Dr. D.C. Findlay gave up his position as Special Advisor on Mineral Resources to succeed Dr. G.B. Leech as Director of the Economic Geology Division.

National Geological Surveys Committee Meetings

The NGSC, under the co-chairmanship of R.A. Price and W.D. McRitchie, met January 18, 1983 in Ottawa, immediately preceding the GSC Current Activities Forum.

Decade of North American Geology

Good progress was made during the year on the new edition of Geology and Economic Minerals of Canada, and contributions to the Decade of North American Geology, under the coordination of J.O. Wheeler.

R.A. Price

Attendance at Meetings, Conferences and Courses

Annual Meeting of Advisory Council of Centre for Resource Studies, Queen's University, Kingston, Ontario (-Chairman); April 14, 1982.

Meeting of Cordilleran Section of Geological Society of America, Anaheim, California (USA), (Speaker - "Mid-Proterozoic to Oligocene Cordilleran Tectonic Evolution, Northeastern Washington and Adjacent British Columbia"); April 17-18, 1982.

Meeting with Ontario Geological Survey, Toronto, Ontario, (- Discussion of Earth Sciences Thrust Document); May 11, 1982.

Meetings of Canadian Geoscience Council and Canadian Geological Foundation; annual meeting of GAC/MAC/CGU; Conference with officials of Manitoba Department of Energy and Mines, Winnipeg, Manitoba, May 16-20, 1982.

Meeting of Geological Society of America Steering Committee for Decade of North American Geology (DNAG) Project, Denver, Colorado (USA) - Member; May 24-26, 1982.

B.C. Department of Mines, Victoria, B.C., (Discussion with officials re Earth Sciences Thrust Document); and meeting with staff at Pacific Geoscience Centre, Sidney, B.C.; June 2-4, 1982.

Meeting with Quebec Provincial Government officials, Montreal, (- Discussion with officials re new mineral resource development agreement program); June 9, 1982.

Annual Meeting of American Association of Petroleum Geologists , Calgary, Alberta, (- Speaker: "The Cordilleran Overthrust Belt in Southern Canada: its Regional Tectonic Implications, and its Role in Hydrocarbon Generation and Entrapment"); Visit to GSC field party at Grande Cache, Alberta, and visit to Geological Survey of Canada's Institute of Sedimentary and Petroleum Geology; June 26 -July 9, 1982.

International Symposium on Archean and Proterozoic Geologic Evolution and Metallogenesis, and XXXII Brazilian Geological Congress, Salvador, Brazil, (- Speaker: Opening Address - "The International Lithosphere Program"); Sept. 6 - 13, 1982.

Québec Ministère de l'Énergie et Ressources, Quebec City, (- Discussions of proposed mineral resource development agreement); Oct. 14, 1982.

Annual Meeting of Geological Society of America, New Orleans, LA (USA), (- Speaker: "The Geotectonic Significance of the Cordilleran Foreland Thrust and Fold Belt of Canada"); (- Poster Session - Co-Author with J.H. Monger, et al: "Transect B2: Southern Canadian Cordillera, North American Continent-Ocean Transect Program"); (Meetings of Inter-Union Commission on Lithosphere - President); (Meeting of Geological Society of America Steering Committee for the Decade of North American Geology (DNAG) Project -Member); Oct. 15 - 22, 1982.

6th Annual Review of Activities of Department of Mines and Energy, St. John's, Newfoundland; Nov. 3 - 4, 1982.

Annual Meeting of Canadian National Committee-International Union of Geological Sciences and Canadian Geoscience Council Committee on International Scientific Relations, Ottawa, Ontario; Nov. 9, 1982.

Board of Directors Meeting of Centre for Resource Studies, Cominco Boardroom, Toronto, Ontario - Member; Nov. 12, 1982.

Carleton University, Ottawa, Ontario, (- Speaker: "The Cordilleran Overthrust Belt in Southern Canada: its Regional Tectonic Implications, and its Role in Hydrocarbon Generation and Entrapment"); Nov. 16, 1982.

Open House, Manitoba Department of Energy and Mines, Winnipeg, Manitoba; Nov. 18, 1982.

Open House, Quebec Department of Energy and Mines, Quebec City, Quebec; Nov. 25, 1982.

Annual Meeting of Canadian Geoscience Council, Ottawa, Ontario; Dec. 6-7, 1982.

Sverdrup Basin Analysis Workshop and Resource Appraisal, Institute of Sedimentary and Petroleum Geology, Calgary, Alberta; Dec. 8-9, 1982.

Vancouver, B.C., (- Board interviews for new Director of Pacific Geoscience Centre, Sidney, B.C.); (- Visit to Cordilleran Geology Division); Jan. 12-14, 1983.

6th Australian Geological Convention, Canberra City, Australia, (- Speaker: "Keynote Address - The International Lithosphere Program"); (- Speaker: "A Transect of the Southern Canadian Cordillera"); (- Speaker: "The Cordilleran Foreland Thrust and Fold Belt of Southern Canada"); (- Meeting with members of Bureau of Mineral Resources, Canberra City, Australia); (- Discussions re scientific exchange program); Feb. 18 - 25, 1983.

Long-range Planning meeting, Atlantic Geoscience Centre, Halifax, Nova Scotia; March 22, 1983.

Membership on Committees

Fellow - Royal Society of Canada.

Fellow - Geological Society of America.

Fellow - Geological Association of Canada.

Professional Engineer, Member of Association of Professional Engineers of the Province of Ontario.

Member - Canadian Society of Petroleum Geologists.

Member - American Geophysical Union.

Member - American Association of Petroleum Geologists.

Member - Society of Sigma Xi.

Member - Association of Geoscientists for International Development.

Associate Editor - Bulletin of Canadian Petroleum Geology, 1981 -

Member - Editorial Board, Journal of Structural Geology, 1978 -

Member - National Research Council of Canada Committee on International Scientific and Technological Affairs (CISTA), 1980-

Member - Commission for the Geological Map of the World 1980 -

President - Inter-Union Commission on the Lithosphere (International Council of Scientific Unions) 1980 -

Member - Centennial Program Steering Committee, Geological Society of America, 1980-

Member - Advisory Committee, Department of Geology, The Memorial University of Newfoundland, 1981 -

Member - Canadian Geological Foundation, 1982 -

Member - Board of Electors, Department of Earth Sciences, Cambridge University, 1982 -

CHIEF GEOLOGIST

J.G. Fyles

Attendance at Meetings, Conferences and Courses

Meeting to discuss Thrust document with representatives of the governments of Newfoundland, Nova Scotia and New Brunswick, in Halifax, May 5, 1982.

Meeting with Ontario Geological Survey to discuss Thrust document, Toronto, May 11, 1982.

Geological Association of Canada Meeting, Winnipeg, May 18-19, 1982.

Visited GSC field parties in the North, July 20-29, 1982.

Discussions of proposed mineral resource development agreement, Québec Ministère de l'Énergie et Ressources, Quebec City, October 14, 1982.

Chairman, meeting between GSC and B.C. Department of Energy, Mines and Petroleum Resources, on current and future programs, in Vancouver, October 29, 1982.

Meeting between Ontario Geological Survey, and GSC concerning Precambrian program in Toronto, November 17, 1982.

Open House at St. John's, Newfoundland, Department of Mines and Energy, November 3-4, 1982.

Open House at Department of Mines and Energy, Halifax, December 1-2, 1982.

Open House at ISPG, Calgary, November 23, 1982.

National Geological Surveys Committee Meeting, Ottawa, January 18, 1983.

Meeting with INA Regional Geologist for N.W.T. on GSC program in N.W.T., Yellowknife, January 21, 1983.

INA Workshop on the Development of a Comprehensive Conservation Policy and Strategy for the N.W.T. and Yukon, Whitehorse, February 27 to March 1, 1983.

Meeting in Ottawa between EMR and Québec Ministère de l'Énergie et Ressources on possible new mineral agreement, March 1, 1983.

Prospectors and Developers Convention, Toronto, March 9, 1983 and meeting with Manitoba officials on interim Federal-Provincial agreements.

SPECIAL PROJECTS

T.E. Bolton

Attendance at Meetings Conferences and Courses

Third North American Paleontological Convention, Montréal, Québec, August 1982.

Field Excursions, IV International Symposium on the Ordovician System, Sweden-Norway, August 1982.

Annual Meeting Northeastern Section, Geological Society of America, Kiamesha Lake, New York, March 1983.

Membership on Committees

Member, Canadian Geoscience Council, Committee on International Scientific Relations.

Chairman, Canadian Society of Petroleum Geologists, Lexicon Committees, Central Canada and St. Lawrence Lowlands.

Member, International Palaeontological Association, Select Committee for a World Directory of Paleontological Collections.

Member, Advisory Committee Ph.D. thesis W.G. Parkins, University of Ottawa.

Corresponding Member, IUGS Subcommission on Silurian Stratigraphy.

Corresponding Member, IUGS Ordovician-Silurian Boundary Working Group.

D.C. Findlay

See Economic Geology Division.

A.V. Okulitch

Andrew V. Okulitch was assigned to the Geological Atlas of Canada Program in July, 1982. He will continue to be based in Calgary. After discussion with present and potential participants, a new guide for compilers was produced. The guide incorporates information on standards for data compilation and presentation, including symbols, colours, time scales, etc. Some integration of standards with those being established for the DNAG project with those for other 1:1,000,000 scale maps of the National Earth Science Series was done. A tentative schedule and priority list was set up and approximately 15 maps are in various stages of production, the first of which may appear late in 1984.

Attendance at Meetings, Conferences and Courses

Coordination of Atlas Map Production, Ottawa, August, 1982.

Penrose Conference, Sonoma Orogeny, Winnemucca, Nevada, September, 1982.

Ad Hoc Committee, 1:1,000,000 National Earth Science Series, Ottawa, October, 1982.

Canadian Tectonics Group Workshop, Gravenhurst, Ontario, October, 1982.

Cordilleran Tectonics Workshop, Vancouver, February, 1983.

Ad Hoc Committee, 1:1,000,000 National Earth Science Series, Ottawa, March, 1983.

Membership on Committees

Member, Ad Hoc Committee, 1:1,000,000 National Earth Science Series.

Chairman, Structural Geology and Tectonics Division, Geological Association of Canada.

Talks

"Preliminary Structure Sections, Southern Ellesmere Island, N.W.T." at Canadian Tectonics Group Workshop, Gravenhurst, Ontario, October, 1982.

"The Shuswap Metamorphic Complex: Its Role in Cordilleran Tectonics" at University of Toronto and McGill University, October, 1982.

"Problems in Tectonics of the Shuswap Complex" at Cordilleran Tectonics Workshop, Vancouver, February, 1983.

A.R. Berger

Dr. Berger continued to carry out a variety of international tasks for the Branch in addition to serving as editor of EPISODES (see section following). During the greater part of the year he was seconded part time to the International Development Research Centre and assisted in formulating their new funding program for geoscience research. With B. Manistre, he commenced a survey of the international activities carried by the Geological Survey. This task will continue in the next fiscal year.

Attendance at Meetings Conferences and Courses

Landplan I - International Symposium on Soil, Geology and Landforms, Bangkok, Thailand, April 1982.

IDRC Consultations on Precambrian of East Africa and on Small Mining Network, Nairobi, May 1982.

2nd International Conference on Geological Information, Golden, Colorado, May 1982.

IDRC Consultation on Peat, St. John's, June 1982.

AAPG Annual Meeting, Calgary, June 1982.

Joint Oceanographic Assemblies, Halifax, August 1982.

GSA Annual Meeting, New Orleans, October 1982.

CNC/IUGS and SCIGR Meetings (CGC), Ottawa, November 1982.

CGC Meetings, Vancouver, September, and Ottawa, December 1982.

Geological Society of Africa Conference, Nairobi, December 1982.

IUGS Executive Meeting, Bangkok, Thailand, January 1983.

Membership on Committees

Member, IUGS Advisory Board for Publications.
Foreign Secretary, Canadian Geoscience Council.

Vice President, Association of Geoscientists for International Development.
Member Mineral Industries Panel of Intermediate Technology Development Group.

EPISODES SECRETARIAT

The EPISODES Secretariat is responsible for publishing and distributing EPISODES, the quarterly newsmagazine of the International Union of Geological Sciences (IUGS), and other IUGS publications, as well as for public relations and promotion work for IUGS, particularly in North America. During 1982-83 the EPISODES Secretariat continued to be co-located with the Geological Survey of Canada.

Substantial effort was directed throughout the year to generating high quality contributions to EPISODES, promoting sales and distribution, and improving office management. Displays were mounted at a number of national and international conferences. The many new subscriptions were balanced by subscribers removed because of non-payment of dues.

The IUGS New Publication Series gained popularity and a record number of sales were handled. The EPISODES Secretariat continues as the main distribution point for these publications, but a search was begun for an alternative distribution center.

The EPISODES staff consisted of Dr. A.R. Berger (Editor), Mrs. Barbara Collis (Executive Secretary), Mrs. Phyllis Gray who was replaced in September by Mrs. Jeanne Spencer as Bookkeeper-Publication Distribution Manager, and Ms. Anne Marie Smart who was succeeded as Production Supervisor in October by Ms. Pat Revelle. Mrs. Jean Jenness continued to act as editorial consultant and Dr. J. Gravesteijn (BRGM, France) as compiler of the Maps Available column. Scientific reviewers and advisers on publication policy provided useful assistance.

COOPERATIVE PROGRAMS - NOVA SCOTIA AND NEWFOUNDLAND

The cooperative mineral programs between Canada (EMR) and Nova Scotia (Department of Mines and Energy) and between Canada (EMR) and Newfoundland (Department of Mines and Energy) completed their first effective year of operations. These two programs, which are funded under the Mineral Policy Sector, are successors to the federal-provincial mineral development subsidiary agreements funded by DREE. The geological work under these programs is organized and managed on behalf of GSC by W.H. Poole of the Economic Geology Division. Throughout the year Gordon Arnold carried the administration of the two programs, in addition to his regular duties as Administrative Officer of the Precambrian Division.

Within the program in Nova Scotia, GSC spent $744 K on projects including a geological study of the origin of the gold deposits, surficial geology and geochemistry of glacial till, geochemical distribution of metals in stream sediments, aeromagnetic gradiometer survey to support the gold deposit study and airborne radiometric survey to characterize granites and especially to detect uraniferous granites.

In insular Newfoundland and Labrador, GSC spent $1,348 K carrying out projects which included geological and geophysical studies at Buchans mine, geological mapping in Labrador and insular Newfoundland, surficial geology and till geochemistry within the Central Mineral Belt in Labrador, and a geochemical lake sediment survey over a large area of southwestern Labrador.

The Geological Survey and the two provincial departments are pleased with what has been accomplished in geoscientific projects and with the trust and goodwill which characterized our working relations. Most leaders of projects supported by GSC under the programs are provincial staff members. Uncertainties and difficulties understandably encountered with management and administration of these new arrangements were overcome to the satisfaction of all parties.

PROGRAM OFFICE

Program Office evaluates the work of the Branch from the viewpoint of its effectiveness and efficiency in meeting Branch objectives. The Program Office Head acts as a senior staff adviser to Branch Management.

The Project Management System is carefully monitored and reviewed on behalf of the Chief Geologist. A complete catalogue of scientific and technical projects is prepared and published each year, as well as lists of proposed field work in the Provinces and Canada lands. Annual reports are prepared for the EMR Annual Report, the publication on Government Activities in the North, and on statistical data for MOSST and STATSCAN. The status of mapping by the GSC is presented on a map sheet, published biennially, that shows the status of bedrock, surficial, airborne gamma-ray spectrometry coverage, regional geochemical, aeromagnetic and shipborne magnetometer coverage.

The Branch Program, the preliminary and revised estimates, and the strategic objectives and long term plans are reviewed on a division by division basis with the Chief Geologist and the individual divisions. This information and the divisional performance plans and reports are used to prepare the Branch submissions to the ADM, Earth Sciences.

D.G. Benson

Attendance at Meetings, Conferences and Courses

IGCP-CNC Eighth Annual Meeting, Ottawa, March 21, 1983.

Personnel Notes

D.G. Benson assumed the duties of Chief Program Officer in June replacing A.M. Kelly who had been in the position since August 1981.

M.A. Petre assumed the duties of Program Officer in September.

ADMINISTRATIVE SERVICES

Y. Claude

Administrative Services in the Geological Survey is comprised of four Units namely the Procurement, Chemicals and Stationery Stores; Building Maintenance, Inventory and Vehicles Services; Branch Records & Messenger Services; and the Word Processing Centre. The Responsibility of these sections is to provide administrative support to the Ottawa based Divisions as well as functional guidance and advice to the Regional Offices.

Administrative Services also provides administrative guidance and advice to the Geological Survey on all administrative matters by assessing the implications of new and changing Treasury Board policies and guidelines and department directives upon the administrative support staff and the operational Divisions and implementing them as they relate to the GSC. The Units also coordinate and administer the renovation plans; the Branch Energy Conservation Program; Security/Safety and Emergency Disaster programs; Field logistic requirements; and controls the Branch Parking allocation.

Meetings attended by staff of Branch Administration

Departmental Administrative Committee
Departmental Safety Committee
Departmental Parking Committee
Departmental Suggestion Award Committee
Departmental Energy Conservation Committee
Departmental Forms Management Committee
Departmental Cafeteria Committee
GSC Branch Management Committee
GSC Administrative Officers' Committee
GSC Safety Committee
GSC Emergency Organization
GSC Energy Conservation Committee

This year's highlights include the launching of the NATO Codification System project; a common identification system for identifying all Capital equipment. This project is being carried out in preparation of the arrival of the New Computerized Inventory System presently being developed. Two other major projects have also surfaced this year: one is the revenue dependancy program -a Public Works Canada Cost Recovery System going up for implementation in 1984; and the other is the Access to Information and Privacy Act which will cause a review of the Branch Records holdings. On April 1, 1982, Administrative Services undertook the responsibility for the distribution of all Branch employees' cheques and the Energy Conservation light fixtures project was implemented in the 601 Booth Street building.

Personnel Notes

In August 1982, Joan Clark left the Survey to join Administrative Services at EMR Headquarters. Randy Robinson has replaced Joan as the Branch Records Office Supervisor. Joan Clark and Kathy Gareau have both successfully completed Language Training.

Other staff changes include: Arrivals - Diane Winsor Murielle Pelletier and Christine Parkinson to the Word Processing Centre; Gino Monteforte to the Branch Records Office; Michel Bradley to the Building and Vehicle Services. Departures - Rhéal Constantineau on March 31, 1983 from Shipping and Receiving, Claude Lacroix, Building and Vehicles Services; Dawna Ramsay and Francine Mellor, Word Processing Centre.

BRANCH PERSONNEL UNIT

K. FRACKE

HIGHLIGHTS

The role of the Personnel Unit in the Geological Survey of Canada during the 1982/83 has been in the field of recruitment and promotion of employees through the competition process and the processing of classification actions. Staff Relation actions required the interpretation of collective agreements and problems associated with grievances.

The following is a numerical breakdown of staffing and classification actions processed by the Personnel Unit during the fiscal year.

STAFFING ACTIONS

Type 1 Appointments (Term and F.T.C.)
Open Competition

Scientific and Professional	73
Admin. and Foreign Service	11
Technical	29
Admin. Support	43
Operational	11
	167

Type 2 Appointments (Term and F.T.C.)
Closed Competition

Scientific and Professional	45
Admin. and Foreign Service	9
Technical	21
Admin. Support	14
Operational	4
	93

TOTAL: Type 1 and 2 =		260
STUDENTS:	COSEP	111
	SUMMER CANADA	109
TOTAL:		220

CLASSIFICATION ACTIONS:

Indeterminate	350
Term	278
TOTAL:	628

BRANCH FINANCIAL SERVICES

J. Stapledon

The Branch Financial Services in the Geological Survey consists of the Branch Finance Office and the Accounting Operations Office, both of which are the responsibility of the Branch Financial Comptroller.

The Branch Finance Office coordinates the annual Multi Year Operational Plan and Main Estimates exercises, coordinates and reviews the forecasting of expenditures, ensures that Treasury Board guidelines and departmental procedures are implemented as they apply to financial matters, provides the link with the Financial Administration Branch, and generally provides functional guidance to divisions on all financial matters.

The Accounting Operations Office is the most visible unit of Branch Financial Services. The staff is charged with making travel arrangements, auditing and processing field accounts, travel and removal claims for all divisions of the GSC and the payment of all invoices for the Director General's office and Branch administration. The payment of such items as freight, express, telephone and taxis are also handled by this group.

The following staff changes took place in Financial Services during the 1982-83 year:

Stapledon, Jeff	- May, 1982	- promoted to Branch Financial Comptroller.
Taylor, Randy	- September, 1982	- from Public Works Canada, joins us as the new Head, Accounting Operations.
Forbes, Heather	- February, 1983	- from RCMP, joins us as Financial Planning Officer.
Eastham, Angie	- February, 1983	- commenced French Language Training.

REPORT ON THE 1983 CURRENT ACTIVITIES FORUM

January 19-20, 1983

Chairman:	A.G. Darnley
General Co-ordinator:	P.J. Griffin
Poster Session Co-ordinator:	C.C. Durham
Technical Session Co-ordinator:	J. MacManus
Registration Co-ordinator:	E.J. Carr
Location:	Ballrooms A & B Skyline Hotel, Ottawa

The format for this year's Forum was the same as in 1982, with 18 talks and 35 poster sessions. The only significant change in program structure, made in answer to comments received in 1982, was to open the first morning with three overview papers relating to the work of G.S.C. Divisions outside Ottawa. This year a public lecture was given on the evening preceding the Forum and the poster sessions were open to the general public before and afterwards. The lecture "Mount St. Helens and the volcanoes of Western Canada – a new awareness of the hazards and benefits", was given by Jack Souther and was designed for an informed lay audience. Attendance was estimated to be 150-200 persons, which is good for an Ottawa winter evening. Jack Souther's presentation was excellent. Communications EMR could have done better with respect to publicity. The penultimate lecture of the Forum on "Natural Radiation Exposure in Canada" by Bob Grasty was notable for its pyrotechnic displays. Interviews were given by several members of staff to Radio Canada International and the local press on the subject of volcanoes, the work of G.S.C., natural radiation, and searching for COSMOS satellites. The cost for the 1983 Forum was $6,231.45 and is described in detail in Table 2.

External registration this year was 266 out of a total of 441, with 34 per cent of the external total from industry and 37 per cent from universities (see breakdown in Table 1). The increase of about 50 people above the attendance at the 1982 Forum is largely due to the increase in university student attendance (45 in 1982, 100 in 1983). The decrease in the number of industry representatives from 105 to 90 reflects the state of the economy. Several companies that sent representatives in 1982 are no longer in existence. This is probably the explanation for the fact that fewer people participated this year in the informal evening session.

Some justifiable complaints were received about the audibility of presentations. Overall the Forum can be considered to have been a success.

TABLE 1 – REGISTRANTS

	1983	%	1982	%
Industry	90	20	105	31
Provincial Agencies	23	5	12	4
Federal Agencies	37	8	24	7
Universities	100	23	45	13
Unassigned	16	4	10	3
GSC staff	175	40	146	43
TOTAL (excluding GSC)	266	60	196	57
GRAND TOTAL	441	100	342	100

TABLE 2 – EXPENSES

Rental of:	Ballroom A	$ 1,367.56
	Ballroom B	600.00
Hospitality		963.80
Audio-visual equipment rentals		550.00
Extra lighting and uprights		725.00
Display boards		285.00
Truck rental		82.50
Printing Costs:	Program, etc.	600.00
	Paper 83-8	800.00
Advertising Northern Miner (paid by EMR)		
	Ottawa Citizen	104.30
	Le Droit	52.50
Misc. name tags, pins, etc.		100.00
TOTAL		$ 6,231.45

ATLANTIC GEOSCIENCE CENTRE

M. J. Keen

The Division objectives are to esure the availability of geological information and expertise on that area of Canada comprising the Atlantic and Arctic offshore regions and the sedimentary basins of the Appalachian region, for the identification of the resource base, the formulation of energy and mineral policy, and to facilitate exploration of Canadian resources.

We meet these objectives by: undertaking geological, geophysical and geochemical research and surveys to national standards; regional interpretation and synthesis of the processes and history of geological evolution; establishment of appropriate national and international standards for geological chronology, correlation, reference materials and surveys; identification of the characteristics and probable locations of occurrence of coal, oil and gas resources and estimates of their abundance identification of the characteristics of the terrain offshore for its safe and proper use; development of methods and technologies to improve the effectiveness of marine geoscience surveys, discovery of resources and the determiation of terrain properties; the dissemination of information.

The Division is organized into five Subdivisions: Administration, Eastern Petroleum Geology, Environmental Marine Geology, Regional Reconnaissance and Program Support. The staff consists of one EX, four Senior Managers, 40 Research Scientists, Physical Scientists, Engineers and Computer Scientists, 35 Scientific and Technical Support staff, 10 Administrative, Secretarial and Clerical staff.

ADMINISTRATIVE SUBDIVISION

The objectives of the Administration Subdivision are to provide efficient and effective financial, personnel and general administrative guidance and support to the Atlantic Geosience Centre. The Subdivision consists of the Director's Office, Personnel Office and Finance Office, with each section supplying the general administrative support necessary to ensure a smooth operation.

Personnel Notes

The Subdivision consists of a permanent staff of a Director and secretary; an Administrative Officer, a Financial Clerk, a Personnel Clerk and a secretary.

During the year, Mrs. Deloros Tolliver joined us as Personnel Clerk to replace Mrs. Carol Racine, who is participating in the WIN Program.

Attendance at Meetings, Conferences and Courses

M. J. Keen

IUGG Meeting, Halifax, N.S., April 15-16, 1982

GSC Branch Management Committee meeting, Ottawa, April 28-29, 1982

CGU Annual Meeting, York University, Toronto, May 10-12, 1982

GAC/MAC Annual meeting, Ottawa, May 18, 1982

International Program of Ocean Drilling meeting, Washington, May 19-20, 1982

NSERC Site visit, Memorial University, Newfoundland, July 12-13, 1982

NSERC meeting, Memorial University, Newfoundland, September 2, 1982

NSERC meeting, Ottawa, September 20-23, 1982

GSC Branch Management Committee meeting, Ottawa, October 5-6, 1982

JOIDES Planning Committee meeting, Austin, Texas, November 9-12, 1982

GSC Branch Management Committee meeting, Ottawa, November 30 - December 2, 1982

NSERC meeting, Ottawa, December 3-4, 1982

Canadian Geoscience Council meeting, Ottawa, December 6-7, 1982

DFO/EMR Guiding Committee on Offshore Surveys Committee meeting, Ottawa, December 9, 1982

GSC Current Activities Forum, Ottawa, January 19-20, 1983

GSC Branch Management Committee meeting, Ottawa, January 26, 1983

GSC Branch Management Committee meeting, Calgary, March 16-17, 1983

Seabed II Steering Committee meeting, Ottawa, March 31, 1983

Membership on Committees

M. J. Keen

Atlantic Sub-committee on Oceanography

DFO/EMR Joint Guiding Committee on Offshore Surveys

BIO Directors' Committee

Dalhousie University, Adjunct Professor

NSERC Interdisciplinary Advisory Panel on Strategic Grants on Oceans

Canadian Geological Foundation, President

Atlantic Regional Interdepartmental Committee on Environmental Issues

Canadian Geophysical Union, President

OSS (Atlantic) Management Committee

Canadian Geoscience Council

Chairman, BIO Safety Committee

JOIDES Planning Committee

EASTERN PETROLEUM GEOLOGY SUBDIVISION

G.L. Williams

The mandate of the subdivision is: to expand our knowledge of the subsurface geology of the sedimentary basins of offshore eastern Canada and adjacent areas; to interpret the hydrocarbon potential of such basins and complete periodic resource appraisals of the same; and to develop predictive quantitative models for passive continental margins. There is also a commitment to study the Upper Paleozoic basins of the Atlantic provinces. The data base for the Upper Paleozoic investigations includes surface sections, coal, salt and potash mines and some core holes. Offshore studies utilize industry collected information, such as multichannel seismics and the hydrocarbon exploration wells.

The twenty-three scientific projects in the subdivision can be placed into one of four programmes: petroleum geology; resource appraisal; biostratigraphy; and data bases. Within petroleum geology there are three operating disciplines: petroleum geology; geophysics; and lithostratigraphy. The three subprogrammes in resource appraisal are: oil and gas; coal; and source rock evaluation. Biostratigraphy includes palynostratigraphy and micropaleontology. Presently, there are five major data bases. These are WELLSYS, EASTFILE, BIOSTRAT, KREMPFILE and KOALA. Although the data base programme is treated separately, it spans all the scientific studies. Discussion of highlights in the following section will be according to programme.

The subdivision's workload reflects, in part, industry activity in the offshore. Since the major hydrocarbon discoveries, Venture and Hibernia, there has been renewed interest in the Scotian Basin and East Newfoundland Basin. Accompanying this has been an upsurge in the number of seismic surveys, although, as yet, we have received very little of the new multichannel data. Other east coast areas, such as the Labrador Shelf, have witnessed a slowdown in drilling programmes. Contiguous areas being studied by individual scientists include the North Atlantic, both in the deep oceanic basins and the eastern margin, western Europe and the eastern Arctic.

One key aspect of the subdivision's mandate, the resource appraisal programme, inputs into the interdepartmental assessment. This is carried out in collaboration with the federal regulatory agency, Canada Oil and Gas Lands Administration (COGLA), which has now opened an office in Halifax. COGLA is also responsible for curation of all industry data on the offshore east coast. We anticipate continuation of such cooperative ventures (no pun intended) in future years.

Highlights

Petroleum Geology

A major thrust of this programme has been directed towards a study of the subsurface geology of the Georges Bank Basin. This has necessitated scientific management of a contractual phase, which was concerned with an assessment and analysis of more than 38,000 km of multichannel seismic data plus in-house interpretation of 10,000 miles. From this was compiled a suite of maps delineating depth to horizon (seven) and thicknesses of individual lithological units (four). Biostratigraphic control was primarily from the COST G-1 and G-2 wells on the Georges Bank and Shell Mohawk B-93 on the Scotian Shelf. A final report is now in preparation.

Our interdisciplinary approach to the East Newfoundland Basin is beginning to yield results. The detailed biostratigraphic analyses of several wells has allowed a reinterpretation of the Hibernia structure. These analyses have indicated that other parts of the East Newfoundland Basin may hold more promise than originally suspected. The biostratigraphy is being correlated with the regional seismic stratigraphy, lithostratigraphy, and maturation studies as a necessary prerequisite to publishing the regional geology.

Work continues in Baffin Bay where well control is sparse, but bedrock samples are providing clues to the regional geology. This is a joint study with members of the Regional Reconnaissance Subdivision and is based on cores obtained with the BIO drill.

The successful change of work assignment of one subdivision scientist is reflected in completion of the Solander Trough project. Solander Trough, located south of South Island, New Zealand, has been the scene of recent exploration by the oil industry. The present study involved interpretation of available potential field and single channel seismic. Structure and isopach maps have been prepared for three and four horizons respectively.

A major publication is now in preparation on the data collected during the DISCOVERY 1980 and FARNELLA 1981 cruises. The paper will include interpretation of single and multichannel seismic, potential field and GLORIA data from the continental margin between Orphan Knoll and the Newfoundland Ridge. Four major seismic units can be recognized in the subsurface section beneath the slope and rise. The units are tentatively dated as Early Cretaceous, Late Cretaceous, Paleogene and Neogene. These are underlain by several types of seismic "basement". GLORIA has demonstrated that the concentration of topographic peaks on the northeastern margin of Orphan Knoll are remnants of a partially buried paleolandscape.

Volcanic rocks are present in four wells on the Scotian Shelf. In each case they are interbedded with Lower Cretaceous sediments. The volcanics may occur as basalt sills, dykes and flows. The geochemical print indicates that they are within-plate oceanic alkali basalts derived from the lower mantle. The volcanics are aligned along a continuation of the Newfoundland-Azores fracture zone and may delineate an area of transitional crust. Further studies are now directed towards the Grand Banks.

An extensive field programme to Portugal resulted in extensive sampling of Jurassic-Lower Cretaceous sediments from the Lusitanian Basin. These are providing lithostratigraphic and biostratigraphic control for dating and correlation of coeval sediments on the Grand Banks.

Resource Appraisal

The primary objective of the resource appraisal programme is to provide probabilistic estimates of recoverable oil and gas reserves for all east coast sedimentary basins. Also included under this heading are all of the subdivision's coal studies and source rock evaluation.

This year has witnessed the completion and publication of a departmental report, jointly authored by E.P.G. and I.S.P.G., on the reappraisal of the ultimate oil and gas potential of the Georges Bank area. In the initial stages is a reappraisal of the Scotian Shelf potential. This will be a major undertaking in view of new data from the Venture, Banquereau and Olympia wells.

The petrographic analyses of coal samples from boreholes in the Sydney coalfield indicate that the contained pyrite can be placed into one of eleven classes. The relative percentages of these classes vary both laterally and vertically and may provide important clues to coal composition.

Source rock evaluation studies include fluorescence, vitrinite reflectance and visual kerogen, all carried out within the subdivision. Organic geochemistry is the responsibility of I.S.P.G. Fluorescence analyses for the Primrose wells support the general correlation of the onset of maturation with the onset of thermochemical fluorescence, although each maceral type has a unique fluorescence curve. The different types recognized are spores, gymnosperms, angiosperms, lignin, resinite, dinoflagellates and green algal cysts. Research is presently centred on plotting of the different classes. This approach indicates major differences in maturation curves, even between closely allied organic matter types.

Biostratigraphy

The subdivision's biostratigraphic studies have permitted detailed zonation and correlation of the Paleozoic, Mesozoic and Cenozoic rocks of onshore and offshore eastern Canada and contiguous areas. We are also developing quantitative biostratigraphic zonations which are a refinement of existing models.

Several recent advances have been made in this programme. The proposed spore-dinoflagellate zonation for the Late Jurassic-Early Cretaceous of the Bonnition H-32 well in the Carson Subbasin has been keyed to the foraminiferal-ostracod and standard calpionellid zonations. A detailed micropaleontological study of the COST G-1 and G-2 wells was most timely in view of the Georges Bank project. The oldest datable sediments are Bathonian. Major discrepancies have been uncovered in previous reports produced by other agencies on these two wells.

Completion of a paper on the foraminiferal, ostracod, calpionellid zonation of the Late Jurassic-Early Cretaceous of the western Atlantic margin represented a significant milestone. The study is based on comparative analyses of 28 wells, primarily on the Canadian margin. The proposed zonation has been successfully applied by the U.S.G.S. to some of the COST wells. A re-examination of the foraminiferal assemblages in twenty-two Labrador Shelf-Grand Banks wells has produced more definitive control. This has resulted from the application of new principles of taxonomy and the RASC programme.

From analyses of 13 D.S.D.P. core holes from the Bering Sea and North Pacific, a ninefold zonation has been proposed for the Eocene-Pleistocene. In the Late Miocene to Recent, the zonation has been calibrated with high latitude diatom and silicoflagellate-ebridian zonations. Several taxa, which have also been recorded from North Atlantic D.S.D.P. cores, are described for the first time.

A successful meeting of IGCP Project-148 in Ottawa discussed the present level of expertise in image analysis. Exciting advancements in the medical field appear to be applicable to the study of foraminifera and palynomorphs. Present plans call for purchase of a microcomputer to handle the subdivision's needs in attempts to quantify taxonomic entities.

Data Bases

The capability of WELLSYS, the subdivision's data base on offshore wells, has been expanded by inclusion of all oil and gas test data. The information loaded has been abstracted from well history and subdivision reports. Present plans call for inclusion of published data in the immediate future. The intent is to make WELLSYS readily accessible to industry and academic personnel as well as to departmental scientists.

The BIOSTRAT data base now includes detailed analyses of several thousand samples from more than 80 wells. It is now possible to produce range plots for all these wells at any required scale, either sorted on earliest or latest occurrences and according to fossil group. The plot is also capable of use with an absolute time scale. BIOSTRAT now provides a report on each well, complete with an alphabetic listing of taxa and the author citation. The value of this data base is further enhanced by its ability to produce listings of all known occurrences of individual taxa. This is invaluable when describing and illustrating previously undescribed forms.

KREMPFILE has been restructured to save storage space on the computer and to make it more efficient. The new data base, which contains about 10,000 edited documents, has now been loaded on the Ottawa mainframe, so that it is accessible to other G.S.C. palynologists. About 90% of the published literature in palynology has been abstracted and included in KREMPFILE. The ability of this system to allow comparative searches has already been demonstrated in production of an index on schizeaceous spores. Other equally valuable applications have been in support of biostratigraphic and paleoecologic studies. Now that the new data base is fully operational there should be an upsurge in use during the coming year.

Personnel Notes

The subdivision has a permanent staff of 11 scientists, 6 technicians, 2 draftsmen, and one secretary.

Peter Hacquebard, Senior Coal Geologist, has retired from the G.S.C. after 35 years of service. Peter will stay with us as a "part time" employee for the next fiscal year.

Jonathan Bujak, Palynologist, accepted a position with Petro Canada in Calgary and left our employ in August, 1982.

Donald McAlpine, Petroleum Geologist, joined the subdivision in February, 1983 and will be involved with the Resource Appraisal programme.

Al Grant, Geophysicist, returned to Dartmouth last May after spending 6 months with the New Zealand Geological Survey on a change-of-work station.

Attendance at Meetings, Conferences and Courses

P.A. Ascoli

Meeting of the I.U.G.S. "Working Group on the Jurassic-Cretaceous boundary", Munich, West Germany, June 3, 1982.

III North American Paleontological Convention, Montreal, Quebec, August 5-7, 1982.

M.S. Barss

Meeting of the Kremp Steering Committee, Tucson, Arizona, June 2-5, 1982.

Annual Meeting of the G.S.C. Palynologists, Calgary, Alberta, November 30-December 1, 1982.

E.H. Davies

III North American Paleontological Convention, Montreal, Quebec, August 5-7, 1982.

CIMP/AASP Joint Meeting, Dublin, Ireland, September 11-15, 1982.

Annual Meeting of the G.S.C. Palynologists, Calgary, Alberta, November 30-December 1, 1982.

F.M. Gradstein

I.G.C.P.-148 Course, "New concepts and methods in stratigraphy", Calgary, Alberta, June 20-29, 1982.

III North American Paleontological Convention, Monteal, Quebec, August 5-7, 1982.

I.G.C.P.-148 Workshop "Image analysis", Ottawa, Ontario, October 27-November 1, 1982.

I.G.C.P. Workshop "Theory, application and comparison of stratigraphical correlation methods", Basel, Switzerland, and the UNESCO-I.G.C.P.-148 meeting, Paris, France, November 20-27, 1982.

A.C. Grant

Geological Society of London Conference on "Structural geology and tectonics of the continental shelf of northwest Europe", London, England, January 28, 1983.

G.M. Grant

Ontario Institute of Chartered Cartography, Annual Meeting and Workshop, Lindsay, Ontario, May 30-June 3, 1982.

P.A. Hacquebard

Acadia University Institute's Energy Options Seminar, Wolfville, Nova Scotia, October 28, 1982.

Annual Meeting, Mining Society of Nova Scotia, Ingonish, Nova Scotia, June 24-25, 1982.

Workshop, Canadian Coal Petrographers Group, Edmonton, Alberta, November 24-26, 1982.

Annual Meeting, Atlantic Geoscience Society, Fredericton, New Brunswick, January 28-29, 1983.

R.D. Howie

GAC Newfoundland Section Meeting, St. John's, Newfoundland, March 30-April 1, 1983.

L.F. Jansa

Annual Meeting of A.A.P.G., Calgary, June 25-30, 1982.

ASCOPE/CCOP Workshop on "Hydrocarbon occurrences in carbonate platforms", Indonesia, July 29-August 10, 1982.

IX International Sedimentological Congress, Hamilton, Ontario, August 22-September 5, 1982.

Symposium, "Evolution of sedimentary basins", Lamont Doherty Geological Observatory, Palisades, New York, September 23-24, 1981.

K.D. McAlpine

Interdepartmental Meeting for Resource Appraisal, Halifax, Nova Scotia, March 17, 1983.

W.C. MacMillan

Course, "Introduction to the petroleum industry", Halifax, Nova Scotia, October 13-14, 1982.

Annual Meeting, Atlantic Geoscience Society, Fredericton, New Brunswick, January 28-29, 1983.

M.C. McCarthy

Course, "Introduction to the petroleum industry", Halifax, Nova Scotia, October 13-14, 1982.

C.J. Mitchell

Course, "Introduction to the petroleum industry", Halifax, Nova Scotia, October 13-14, 1982.

J.A. Wade

Interdepartmental Meeting for Resource Appraisal, Calgary, Alberta, December 6-10, 1982.

Meeting with External Affairs on Georges Bank Boundary Dispute, Ottawa, Ontario, March 4, 1983.

G.L. Williams

III North American Paleontological Convention, Montreal, Quebec, August 5-7, 1982.

Meeting of C.S.P.G. National Liaison Committee, Calgary, October 26, 1982.

Meeting of the Advisory Committee to the Petroleum Resources Technology Programme, Halifax, November 18, 1982.

Annual Meeting, Atlantic Geoscience Society, Fredericton, New Brunswick, January 28-29, 1983.

Membership on Committees

P. Ascoli

Member of the I.U.G.S. Working Group on the Jurassic-Cretaceous Boundary.

Member of the Organizing Committee of "Benthos '83" (2nd International Symposium on Benthonic Foraminifera).

M.S. Barss

G.S.C. representative on Steering Committee, Kremp Palynological Computer Research Project.

E.H. Davies

Member, Seminar Committee, Bedford Institute of Oceanography.

Member of the I.U.G.S. Working Group on the Jurassic of the Circum Pacific.

Member of the I.U.G.S Working Group on the Jurassic-Cretaceous Boundary.

Member of the 1982 AASP Nominating Committee.

F.M. Gradstein

Member of the I.G.C.P. Project 148, Quantitative stratigraphic correlation techniques.

A.C. Grant

Associate Editor, Bulletin of Canadian Petroleum Geology.

P.A. Hacquebard

President, Mining Society of Nova Scotia.

Chairman, Canadian Coal Petrographers Group.

Member, International Commission on Coal Petrology.

R.D. Howie

Member of the Federal/Provincial workshop on the New Brunswick Albert Formation oil shale---a National Energy Program (N.E.P.) under the office of Energy Research and Development (O.E.R.D.).

L.F. Jansa

Member, Examination and Advisory Committee for Graduate School, Dalhousie University.

Member, Organization Committee of Ninth International Sedimentological Congress.

G.L. Williams

Maritimes Representative on C.S.P.G. National Liaison Committee.

Associate Editor, Marine Micropaleontology.

Member of Mineral Technology Advisory Committee for College of Cape Breton.

Member of the Advisory Committee to the Petroleum Resources Technology Programme, Nova Scotia Institute of Technology.

Associate Editor, Bulletin of Canadian Petroleum Geology.

Special Talks, Lectures and Poster Sessions

P. Ascoli

Lecture, "Foraminiferal, ostracod and calpionellid correlation across the Jurassic-Cretaceous boundary in the northwest Atlantic", III North American Paleontological Convention, Montreal, Quebec, August, 1982.

E.H. Davies

Lecture, "The application of dinoflagellates to paleoenvironmental problems", III North American Paleontological Convention, Montreal, Quebec, August, 1982.

Lecture, " Initial and acquired fluorescence of palynomorphs", III North American Paleontological Convention, Montreal, Quebec, August, 1982.

Lecture, "Trans-Atlantic palynological correlations of the Early Jurassic", Joint CIMP/AASP Meeting, Dublin, Ireland, September, 1982.

Lecture, "Evolution of the Peridinia", Joint CIMP/AASP Meeting, Dublin, Ireland, September, 1982.

F.M. Gradstein

Lecture, "Jurassic chronology and paleoceanography of Atlantic basins", III North American Paleontological Convention, Montreal, Quebec, August, 1982.

Lecture, "Early Jurassic stratigraphy and micropaleontology of the Grand Banks and Portugal", III North American Paleontological Convention, Montreal, Quebec, August, 1982.

Lecture, "Early History of the Atlantic Ocean", Utrecht University, November, 1982.

Lecture, "On stratigraphic normality", IGCP-148 International Meeting, Geneva, November, 1982.

A.C. Grant

Lecture, "Petroleum exploration, offshore eastern Canada", Geological Society of New Zealand, Wellington, April, 1982; University of Auckland, New Zealand, April, 1982.

Lecture, "Problems with plate tectonics, the Labrador Sea", University of Auckland, New Zealand, April, 1982; Kochi University, Japan, May, 1982.

Three Lectures, "Petroleum Geophysics", St. Mary's University, Halifax, Nova Scotia, October, 1982.

P.A. Hacquebard

Course of 12 lectures on "Composition, origin and geology of coal", Dalhousie University, Halifax, Nova Scotia, April 1982-March 1983.

Lecture, "Coal, the original and enduring fuel of the industrial age", Mining Society of Nova Scotia, Annual Meeting, Halifax, Nova Scotia, June, 1982.

Lecture, "Discussion of paralic and limnic coal basins in Nova Scotia", AGS Annual Meeting, Fredericton, New Brunswick, January, 1983.

R.D. Howie

Lecture, "Carboniferous evaporites in Atlantic Canada", GAC Newfoundland Section, St. John's, Newfoundland, April, 1982.

Lecture, "Evaporites of Atlantic Canada", Atlantic Geoscience Society Meeting, Halifax, Nova Scotia, April, 1982.

L.F. Jansa

Lecture, "Carbonate platforms of eastern North America and their hydrocarbon potential", AAPG Meeting, Calgary, Alberta, June, 1982.

Lectures, "Mesozoic carbonates of eastern North America" and "Development of passive continental margins and their relation to hydrocarbon occurrences", Surabaya, Indonesia, August, 1982.

Lecture, "Importance of paleoceanographic factors for oil exploration", Japan National Oil Company, Tokyo, Japan, August, 1982.

Lecture, "Sedimentary basins: An introduction", IX International Sedimentological Congress, Hamilton, Ontario, August, 1982.

G.L. Williams

Lectures, "Cretaceous dinoflagellates and provincialism" and "Dinoflagellates: past, present and future", III North American Paleontological Convention, Montreal, Quebec, August, 1982.

Invited Paper, "Geology and hydrocarbon potential, offshore eastern Canada", AGS Annual Meeting, Fredericton, New Brunswick, January 1982.

Lecture, "Oil and gas occurrences and source rock studies, offshore eastern Canada, University of New Brunswick, Fredericton, New Brunswick, March, 1983.

The Subdivision staff produced 6 abstracts, 21 biostratigraphic reports on wells, D.S.D.P. cores and outcrop samples, 3 reports on vitrinite reflectance and 5 lithostratigraphic reports on offshore wells during the same period.

Laboratory Statistics

Drafting

Original Figures	289
Revisions in man hours	328

Micropaleontology

Samples picked	1972
Slides prepared	1941
S.E.M. photographs	368
Samples washed	159

Coal Petrology

Reflectance analyses	110
Maceral analyses	47

Palynology

Samples processed	1457
Organic matter samples	826
Slides prepared	5938

Sedimentary Petrology

Thin sections	430
Core pieces slabbed	10
Developed films	7
Negatives printed	366

REGIONAL RECONNAISSANCE SUBDIVISION

R. T. Haworth

The objective of the Regional Reconnaissance Subdivision is to understand the structure and evolution of the continental margins and adjacent ocean basins of eastern Canada and the Arctic; and to make a contribution to global understanding of margins and basins. To do this, geophysical and geological data are collected from BIO ships on a regional basis from Nova Scotia, north as far as northern Baffin Bay, and from ice camps in the Arctic Basin. Detailed studies are carried out in key areas. Scientists interpret this acquired data and integrate it with data from other sources such as offshore oilwells, cruises of other institutions, and publications. International contacts and joint work are an important part of the work.

The Subdivision, comprising fourteen scientists and three scientific support technicians, is divided into sections organized according to both geography and discipline. The Baffin Bay-Labrador Sea Studies section is a geographically defined section because of the logistical problems in mounting operations in the North. The Ocean Basins and Margins section is concerned with determining the structure of the present continental margin, and those processes within the ocean basins that control its development. Systematic geological mapping of the continental margin of Atlantic Canada is carried out by the Scotian Shelf-Grand Banks Studies section, while the Geophysical Surveys section primarily carries out its mapping in conjunction with surveys of the Canadian Hydrography Service.

The Subdivision is administered by a Secretary.

Highlights

Deep Structure and Crustal Processes

A major effort on the processing of expanding spread refraction profiles in conjunction with the large aperture seismic reflection profile conducted in 1981 off New Jersey led to the definition of the fine structure of that continental margin. "Oceanic" crust appears to continue beneath the thinned continental crust on the margin, suggesting that magmatic upwelling started before complete continental separation, underplating the continental crust with a basaltic layer. Further processing of the reflection profile itself has not resulted in significant improvements beyond that obtained by USGS continental margin reflection profile 25.

Initial drafts of four crustal cross-sections of the Canadian margin, prepared as part of the North American transects program, were reviewed in public. The information displayed provides input to our projects on paleogeographic reconstructions of the Appalachians and theoretical modelling of continental margin development.

Investigation of the magmatic upwelling leading to the underplating referred to off New Jersey led to a general investigation of the dynamics of rifting. Initial results suggest that rifting can only be driven by external forces rather than convection beneath the rift axis.

It has been shown that diapirs of high conductivity salt do not focus heat flow sufficiently to produce the enhanced thermal maturity observed over them. Fluid migration around such structures may instead be responsible for the necessary migration of heat. Theoretical modelling of the Carboniferous basin in the Gulf of St. Lawrence shows that its subsidence history can only be explained by several episodes of extension. This study was then extended in cooperation with Dalhousie University to investigate the loading of the continental margin that would be compatible with the amount of sediment deposited in the U. S. Appalachian basins during the early Paleozoic. The inferred areal distribution of imposed loads provides significant constraints over tectonic models for the region.

Magnetic anomaly lineations within the North Atlantic, Labrador Sea, Baffin Bay and Arctic Ocean have been used in attempts to develop an integrated plate kinematic model for these regions. These results will be published as contributions to the Decade of North American Geology and will form the basis for developing a field program to investigate the Nares Strait area where geological and geophysical constraints converge.

Geophysical Surveys and Mapping

Evaluation of the new KSS-30 sea gravimeter has continued to demonstrate that we cannot define ships' motion well enough to take advantage of the ultimate sensitivity of the instrument. More navigational and data logging trials are planned for the coming year. Data handling at sea has been much improved with the continued development of SHIPAC. Ashore, there is much debate about the most expedient method to archive and release the available data. The in-house compilation of magnetic data from the Labrador Sea was released on Open File and facilitated two more developments: an analysis of the veracity in the Labrador Sea of the newly defined (1980) geomagnetic reference field, and an investigation of the feasibility of automatic production of National Resource Maps using the Applicon colour plotter. Gravity data for the Labrador Sea have been compiled and submitted to Earth Physics Branch for adjustment appropriate to their national gravity standards.

This effort of releasing data in the Labrador Sea has precipitated the publication of a series of regional maps for the area, constituting the "Labrador Sea Atlas", elements of which will be published over the next two years. Compilations are also underway of data that will eventually be published as part of the Decade of North American Geology. The release of geophysical data on the continental margin of Ireland considerably improved the compilations of geophysical data at the southern marine extremity of the Caledonides. This permitted better correlation of structures with those on the Canadian margin.

Surficial and Bedrock Geology Program

The major effort of the Division in evaluating the structure and evolution of the Gulf of Maine and Georges Bank produced exciting results with interesting consequences. A high resolution aeromagnetic survey of the area between the previous surveys carried out by U. S. and Canadian groups demonstrated general continuity of structure throughout the area. Correlation between the magnetic field variations and the bedrock and basement structure was established by a major shipborne survey. This survey was the first integrated geological-geophysical cruise conducted and (the results) interpreted entirely under contract to a Canadian geoscience consortium.

The Seabed II project, funded under NRC's PILP program, to produce a deep-towed three dimensional geological mapping system was, at year end, approaching its first sea trials. The towed body, incorporating both sidescan and sub-bottom profiling capabilities, is being assembled for towing trials in the 1983 field season, with the first geological results anticipated in 1984. Industrial interest in trying to overcome the problems of drilling through "boulder beds" on the Labrador Shelf led to a major initiative early in the year. A drilling program was planned and organized to establish ground truth for the Quaternary geological section, which had previously been mapped by acoustic methods. Funds were withdrawn from this program at the last moment although a catalogue of critical drilling targets is now available should funding become available. A review of all the surficial geological data on the Labrador Shelf was completed and a series of 1:250,000 compilation maps were completed. A cruise to the area answered a variety of specific scientific questions including identification of the lower limit of contemporary iceberg scouring at $\pm$ 250 m, indications of gas or water venting from the seafloor (possibly triggered by the scouring) and suspected contemporary faulting in Hopedale Saddle.

Investigations of the geology of the Baffin Island Shelf concentrated on sampling critical targets with a longer (30') drill than had previously been available. Despite many problems, several targets were successfully sampled, completing the regional bedrock and surficial mapping of the southeast Baffin Island Shelf and establishing stratigraphic continuity along the eastern Baffin Island Shelf. Critical samples obtained include Upper Cretaceous strata from Home Bay, which included promising petroleum source rock material, semi-consolidated Cretaceous-Tertiary (?) sediments from the Padloping Island and Cumberland Sound areas, and lower Paleozoic carbonates from Hudson Strait. Surficial sediment core and IKU clamshell samples obtained will assist correlation and interpretation of glacial, pro- and post-glacial sediments and events in the Baffin Bay-Labrador Sea region.

Personnel Notes

Ian Reid was hired as a Marine Seismologist.

Lew King retired after 28 years' service with the GSC.

Paul Girouard transferred from the Baffin-Bay Labrador Sea Studies section to the Geophysical Surveys section.

The Subdivision presently consists of a permanent staff of 14 scientists, 3 technicians, 2 term employees, and a secretary.

Attendance at Meetings, Conferences and Courses

G. B. Fader

Second Canadian Conference on Marine Geotechnical Engineering by Canadian Geotechnical Society - Bedford Institute, Dartmouth, N. S. - June 8-11, 1982

Joint Oceanographic Assembly, Dalhousie University, Halifax, Nova Scotia, August 2-13, 1982

International Association of Sedimentologists Eleventh International Congress on Sedimentology, Hamilton, Ontario, August 22-28, 1982

The Geological Society of America, Northeastern Section meeting, March 23-25, 1983, Keassesha Lake, New York

I. A. Hardy

Joint Oceanographic Assembly, Halifax, Nova Scotia, August 2-13, 1982

INSTAAR Workshop, March 15-18, 1983, Amherst, Mass.

R. T. Haworth

Geodynamics Transect Meeting, Boulder, Co., April 4-9, 1982

IGCP Workshop, Fredericton, N. B., August 11-17, 1982

Workshop of U.S./Canada/Mexico Geodynamics Committee Transects Program, New Orleans, La., October 17-22, 1982

Gave Geophysics Seminar, Carleton University, Ottawa, Ontario, Nov. 30, 1982

H. R. Jackson

AGU, Philadelphia, May 1-3, 1982

CESAR planning meeting, Ottawa, Ontario, October 27-29, 1982

H. W. Josenhans

GAC, Winnipeg, May 17-19, 1982, Field trip on: Till Stratigraphy and proglacial lacustrine deposits in the Winnipeg area

INSTAAR Workshop, March 15-18, 1983, Amherst, Massachusetts, U.S.A.

C. E. Keen

Geodynamics Transects Meeting, Boulder, Co., April 4-9, 1982

LASE Coordinating Meeting, Lamont, N. Y., May 9-11, 1982

Geological Association of Canada, Winnipeg, May 17-19, 1982

Joint Oceanographic Assembly, Halifax, Aug. 5-16, 1982

International Association of Sedimentologists Congress, Hamilton, Ontario, Aug. 24-26, 1982

CGC Committee on Foreign Relations, Ottawa, Ontario, September 11, 1982.

Lithoprobe Steering Committee Meeting, Ottawa, Ontario, September 24, 1982

GSC Branch Management Meeting, Ottawa, Ontario, October 6, 1982

Workshop of US/Canada/Mexico Geodynamics Committee Transects Program, New Orleans, La., October 17-22, 1982

LASE Coordinating Meeting, Lamont, N. Y., December 2, 1982

DSDP Meeting, San Diego, Ca., January 17-22, 1983

WHOI Tenure meeting, Woods, Hole, Ma., January 24, 1983

Canadian National Committee on the Lithosphere, Ottawa, February 18-19, 1983

LASE Coordinating Meeting, Lamont, N. Y. February 23, 1983

B. D. Loncarevic

Canadian Geophysical Union, Toronto, May 10-13, 1983

International Workshop on Marine Geosciences, Heidelberg, July, 1982

Scientific Advisory Committee for IGCP, Paris, February 7-12, 1983

B. MacLean

Presentation on the Geology of Baffin Island Shelf with G. L. Williams at the Atlantic Geoscience Society, Fredericton, January 29, 1983

R. F. Macnab

Presented lectures on Introductory Geophysics to Cartography II class, Canadian Hydrographic Service, Ottawa, Ontario October 6, 1982

Meeting of DEMR-DFO Ad Hoc Committee on National Earth Science Series (NESS) Maps, Earth Physics Branch, Ottawa, Ontario, March 10, 1983

R. Miller

Joint Oceanographic Assembly (Halifax-Dalhousie), August 2-13, 1982

Second Canadian Conference on Marine Geotechnical Engineering (BIO), June 8 -11, 1982

I. Reid

Attended the Canadian Oceanographic Mission to France, March 7-16, 1983.

S. P. Srivastava

Attended meeting of the IAGA Working Group, I-1 and I-4

J. M. Woodside

Meetings of Directing Board of Bureau Gravimetrique International in May 1982 during General Meeting of International Association of Geodesy, May 7-20, 1982 in Tokyo

Membership on Committees

G. B. Fader

Member of Departmental Committee on Ocean Mining

Member of the "Seabed II" Technical Management Committee

Member of the ICEI Venture Gas Development Working Group

I. A. Hardy

QUPEC/QPEC - Quaternary Paleoceanography of Eastern Canada Working Group

R. T. Haworth

Member, Canadian Working Group and International Special Study Group on Geophysics and Geologic Correlation of IGCP Project 27

Member, Continental Margin Transect Working Group of the Canadian and USA Geodynamics Committee

Tectonic Map of North America Working Group for the American Association of Petroleum Geologists

C. E. Keen

Member, Commission on Marine Geology, IUGS

Chairman, Canadian National Committee on the Lithosphere

Member, Passive Margins Panel, DSDP

Member, Canadian Geoscience Council, Lithoprobe Steering Committee

Member, Canadian National Committees of IUGG and IGCP

Member, Continental Margin Transect Working group of the Canadian and USA Geodynamics Committee

B. D. Loncarevic

Member, Scientific Advisory Committee, IGCP

Editor-in-Chief, Marine Geophysical Researches

S. P. Srivastava

Member of the Working Group I-1 (analysis of the main field and secular variations) of the IAGA

Member of the Working Group I-4 (Magnetic anomalies on land and sea) of the IAGA

J. M. Woodside

Member, Board of Directors, Bureau Gravimetrique International

Subdivision Manuscripts

During the fiscal year April 1, 1982 to March 31, 1983, the Subdivision produced fourteen manuscripts for outside journals, four for inside journals, one for Open File, and seventeen "Abstract Only".

ENVIRONMENTAL MARINE GEOLOGY SUBDIVISION

David J. W. Piper

The subdivision is concerned with marine geological processes, both contemporary and in the late Quaternary, that contribute to near-surface marine geology.

Geographically, our work is concentrated on the coast and shelf of Eastern and Arctic Canada, but also includes international areas of interest to Canada. The purpose of these studies is to provide improved knowledge of recent geological processes, and to provide timely and accurate advice concerning the rational management of the marine environment in the identification, conservation and development of natural resources.

Scientific projects in the subdivision are grouped into eight programs, and highlights of the year are discussed below program by program. For administrative purposes, the subdivision is divided into three discipline-oriented sections.

The subdivision participates in several programs partly funded by agencies outside the G.S.C.: notably work under the Conventional Energy R&D Task of the Office of Energy Research and Development (OERD), and studies of seabed disposal of nuclear waste with Atomic Energy of Canada Limited (AECL).

The subdivision provides most of the expertise within A.G.C. for environmental advice and assessment to regulatory agencies and other levels of government.

HIGHLIGHTS

Coastal Program

Coastal mapping continued to focus on the island of Newfoundland, with reconnaissance surveys extended to the northeast and west coasts. Twelve previously-studied beach sites were restudied. Barrier deposits more than 7 m above mean sea level are susceptible to reworking during storms with an estimated recurrence interval of 30 years. Nearshore surveys of sand distribution were carried out at four critical coastal sites, to assess the role of nearshore sediments in affecting barrier stability.

This year was the first of the three-year program of the Canadian Coastal Sediment Study. The objectives of this study are to sponsor the development of instrumentation to measure instantaneous sedimentation rates in the nearshore zone and to carry out field experiments to evaluate existing engineering procedures for estimating sediment transport rates, to provide intercalibration of different instruments, and to further scientific understanding of sediment transport processes in the nearshore zone. The study is managed by NRC under the guidance of a steering committee (of which David Piper is EMR representative) and is funded by EMR, DFO (Small Craft Harbours), Public Works Canada, and NRC. The study commissioned a state-of-the-art review of nearshore sediment transport instrumentation by Dr. David Huntley, and on the basis of this report, selected acoustic techniques as the most promising for development. A workshop of international experts was convened at BIO to draw up specifics for instrument development. Detailed site surveys were made, largely under the direction of Don Forbes, of Pointe Sapin, N.B., and Pointe Deroche, P.E.I., which will be the sites of major field experiments in the fall of 1983 and 1984 respectively. A substantial amount of equipment was acquired to carry out these field surveys.

Dune restoration sites on Sable Island were resurveyed by Bob Taylor and Dave Frobel, who demonstrated the general effectiveness of the dune restoration program funded by Mobil Oil Canada Limited and supervised by the Terrain Subcommittee of the Sable Island Environmental Advisory Committee. As chairman of this subcommittee, Taylor also edited a volume on "Terrain Management and Biological Studies on Sable Island". In addition, daily changes in beach profile on Sable Island were monitored to assess how rapidly spilled oil might be buried.

A detailed report was completed on the 1981 detailed surveys of 8 beaches and 28 monitoring stations on the coast of Nova Scotia, and further monitoring was carried out. An overview paper by Taylor and S.B. McCann was completed on "Coastal Depositional Landforms in Northern Canada".

A coastal data base system was developed by Aubrey Fricker and summer students; all new coastal data and some old data are now entered in the system, which has improved the efficiency of both storing and retrieving coastal information. The library of oblique aerial coastal photographs was extended to include the Labrador (Saglek to St. Mary's) and Newfoundland coasts.

Coastal Inlets

Jim Syvitski and Charles Schafer led a major HUDSON cruise which investigated ten fjords on the coast of Baffin Island. A Huntec DTS, air gun and sidescan profile was run along the length of each fjord. A series of piston and gravity cores and grab samples were also obtained, and systematic observations made on temperature, salinity, nutrients, dissolved oxygen, plankton, and suspended sediment. The subaerial deltas were investigated in 8 fjords, and in selected areas sidescan sonar records and bottom photographs were obtained. Gravity cores were split on the ship and geotechnical and electrochemical properties measured.

In general, the fjords appear to be sedimentologically highly active in the summer months, with turbidity currents and mass movement important on steep slopes. Biologic productivity is rather low and none of the fjords had anoxic waters; the redox depth in the sediment was highly variable.

Suspended matter in the water indicates that by September the influence of river sediment is low, and resuspension events are important: this may be partly due to internal wave activity during relaxation following strong down-fjord winds. Iterbilung and McBeth fjords had substantial eolian transport of sand from delta to the fjord. Groundwater discharge into the Cambridge Fjord polyna was measured at 0.15 m^3 sec^{-1}. Only Cambridge Fjord was found to have low oxygen water behind its inner sill (3 $mL.L^{-1}$). Preliminary radiocarbon dates suggest that the piston cores penetrate at least 15,000

years sediment accumulation.

A review and planning meeting in February, attended by 23 scientists from seven universities (from Canada, U.S., Scotland, England and the Netherlands) and three government departments (DEMR, DOE and DFO), selected three fjords for detailed investigation on the HUDSON voyage planned for September 1983. Cambridge Fjord has the low dissolved oxygen values in its waters and the High Arctic characteristics in its marine biota. Groundwater flow into the marine water will be monitored. Iterbiling Fjord is representative of a more typical fjord with glacier-derived sediment supplied to a sand plain delta. Pangnitung Fjord has the largest tidal range (5 m) and shallowest sill: resuspension of bottom sediment will be studied here in detail.

Carl Amos has continued to write up his work on the Bay of Fundy and carried out flume tank experiments on critical shear and erosive rates for intertidal mud from the Bay. The muds show higher resistance to erosion than reported from elsewhere, presumably due to subaerial exposure at low tide.

Continental Shelf Program

Work in this program is largely funded by the OERD Offshore Geotechnics Program, and is mostly directed to evaluation of geologic constraints to offshore hydrocarbon development.

On Sable Island Bank and Banquereau, Carl Amos and Ken Asprey collected over 1000 line kilometers of seismic and sidescan data which defined the availability of surficial mobile sand and documented the extent of bedforms. A 500 km long, 35 m thick relict barrier island (extending through Sable Island) was identified. Surficial sediment slumping was found to be widespread on the steep margins of Banquereau. No active sand waves were identified on the two banks.

Carl Amos also prepared a review of worldwide morphometry and genesis of large sandy bedforms, clarifying the definition of sand ridges, sand waves and megaripples. A compilation was prepared of the distribution of these bedforms on the eastern Canadian Shelf and adjacent areas of the U.S. David Piper and Andy Sherin prepared new maps of the percentage distribution of gravel, sand and mud from Long Island Sound to Sable Island, using samples in the AGC data base.

A numeric model is being developed to predict the style and magnitude of sediment transport on the continental shelf under storm conditions, and appropriate data for Sable Island Bank and Banquereau has been entered in a computer data base.

Mike Lewis examined the frequency of iceberg scouring on the Grand Banks of Newfoundland in two ways. Grounding rates based on modern iceberg flux and estimated iceberg draft distributions compared within an order of magnitude with estimates based on the record of ice scours cumulated on the seabed since the marine transgression approximately 10,000 years ago.

During 1982 data were obtained from Saglek Bank in northern Labrador to study, on a regional scale, the relation of iceberg scour occurrences to bathymetry, surficial geology, iceberg flux and oceanographic factors. The seabed disturbance associated with five recently-grounded Labrador icebergs was also mapped for preliminary investigation of ice scour persistence and the mechanics of iceberg related sediment deformation. Information from the regional ice scour data base at AGC was passed to several oil-industry companies during the year.

An interpretation of seabed features at Hibernia was completed; large sand ridges are believed to be relict, but smaller bedforms are probably still active.

Beaufort Sea Program

This program is largely funded by OERD and is closely co-ordinated with members of the Arctic Petroleum Operators Association (APOA). It provides information on seabed stability and other surficial geologic issues related to hydrocarbon exploitation in the Beaufort Sea. The GSC summer field program collected 600 line km of seismic reflection profiles, 31 cores and 23 water samples, to define the geologic character of the upper slope and the Mackenzie Trough, and to confirm the mud volcano hypothesis for some pingo-like features. Joint field work with APOA collected 1500 line km of sidescan and high resolution seismic reflection and other data. This data will be used to assess rates of rescouring by sea ice; the distribution of permafrost; acoustic stratigraphy of the Ikit trough; and the biostratigraphy and geotechnical properties of the upper 100 m of sediment. RALPH was deployed on the toe of the Isserk artificial island berm, and showed that there were infrequent short-lived pulsing currents of up to 50 cm sec^{-1}, strong enough to remobilize the sand of the island.

Data analysis in the laboratory and by contractors has resulted in the completion of three in-house papers or reports and seven contract reports. Sediment creep has been identified as a possible mechanism for failure on the continental slope. At least some pingo-like features have been identified as mud volcanoes. Sedimentological analysis of sands suggests that Beaufort Shelf sands were deposited in deltaic environments and subjected to coastal reworking during transgression.

Compilations of regional surficial geology; shallow acoustic permafrost; and the sediment dynamics of the Beaufort Sea have been completed. Nimbus-7 imagery has been used to analyze suspended sediment dispersion. Consultants reports have been prepared on sidescan technology and mosaicing, and on in-situ borehole geotechnical testing and sampling equipment.

Slope Program

Much of the work in this program is funded by OERD and directed to an assessment of constraints to hydrocarbon development on the continental slope as a result of sediment unstability. Sea Marc long-range sidescan and subbottom profiler studies were completed of two areas on the Scotian Slope. They show that the upper slope in both areas is gullied, leading to debris flows on the mid-slope. In the region between the Acadia and Shubenacadie well sites, extensive areas have lost the top 5 to 20 m of stratified sediment, perhaps as a result of seis-

mic shaking, and have been partly overrun by debris flows. Preliminary biostratigraphic data suggest these debris flows are latest Pleistocene or early Holocene. Seismic data from this area show periodic debris flows interbedded with draped stratified sediment. Phil Hill has completed two papers on sediment facies on the Scotian Slope.

The project on the nature and magnitude of contemporary processes on the Newfoundland Slope led by Charles Schafer has been successfully terminated. The role of the western boundary undercurrent (WBU) in influencing both sediments and benthic ecology has been defined. Bioturbation which in turn is suppressed by the WBU was found to be important in controlling geotechnical properties. The detailed Holocene paleo-oceanographic evolution of the area was documented. Slumping appears to have been restricted to the Pleistocene.

Deep Ocean Program

The principal work in the deep sea has been the study of geologic and geochemical implications of nuclear waste disposal in the Sohm and Nares Abyssal Plains. Dale Buckley and Ray Cranston led a major HUDSON cruise to the Nares Abyssal Plain obtained seismic data and core samples which indicate poor lateral continuity of sediments over parts of the plain. Some fine-grained apparently pelagic clays display predictable redox and diagenetic trends, but they may be restricted to relatively small areas.

Interpretation of the detailed stratigraphy of the Sohm Abyssal Plain is now almost complete. Source areas of turbidites can be recognized from mineralogy and biota, and an oxygen isotope stratigraphy based on resedimented foraminifera has been established. Pleistocene sedimentation rates vary from 20 to 50 cm.1000 yr^{-1}.

Site selection guidelines for the NEA-SWG have been reviewed and made specific to present known quantities in deep sea sediments. These guidelines based on results of research over the past 8 years include important new data and interpretations obtained as a result of Canadian research over the past 3 years, such as definition of vertical and lateral homogeneity and potential depth of burial based on estimates of rates of chemical diffusion.

Th/Pa dating results obtained from core samples taken in eastern Pacific indicate slow deposition rates (3 cm.1000 yr^{-1}) relative to Atlantic (Sohm) study site. This slow rate of sedimentation and other data on dissolved metal concentration gradients and authogenic mineral occurrences suggests that simple adsorption coefficient corrections (Kd) do not apply to steady state systems.

Experiments using ion exchange membranes indicate that up to 50 percent of Ni, Zn and Cu may be complexed with organics in marine waters similar to pore water. The concentration of Fe in pore waters has been found to exceed the predicted solubility for equilibria with oxides, silicates, hydroxides, sulfates and carbonates. This suggests formation of soluble acid dimer of silicon. Experimental work has continued on assessing the effectiveness of marine clays as barriers to radionuclide migration.

Other work on turbidity currents has focussed on the modelling and interpretation of individual turbidites, notably cordable Holocene turbidites on Navy Fan, and the 1929 Grand Banks turbidite. Deep sea fan morphology is principally a result of thin, fast sandy turbidity currents such as the 1929 event. Thick slow muddy turbidity currents may lead to the growth of large levees, but will often transport sediment to distal plains with little regard for seabed morphology. Muddy turbidity currents may be created by flow stripping at bends in deep sea channels.

At the time of writing, Carl Amos is participating in the CESAR experiment in the Arctic Ocean, investigating contemporary sediment dynamics and collecting surficial sediment cores and acoustic data.

Late Pleistocene and Holocene Programs

Methods of establishing Quaternary paleoecology quantitatively on the eastern Canadian continental margin, using the approach of the CLIMAP group are being developed by a group led by Peta Mudie. In this, modern distribution of foraminifera, dinoflagellates and pollen is related to contemporary environmental factors such as air or water temperature and salinity. Transfer functions thus derived are used to interpret past ocean or atmospheric conditions from fossil records. Papers have been completed on modern distribution of benthic foraminifera on northern shelf areas and of pollen and a 20,000 year record of temperature and salinity changes has been obtained from the Labrador Shelf. Reference stratigraphic sections of late Quaternary sediments have been reported for Bedford Basin, the NE Newfoundland Shelf and Lake Melville.

Detailed work on the glacial history of the Lake Melville - Cartwright Saddle area has been continued by Gus Vilks and collaborators. The postglacial shallowing of Lake Melville by isostatic rebound has been documented; and acoustic profiles, foraminifera, and core lithology show that late Wisconsinan ice did not override the inner shelf off Cartwright.

The mollusc index collection was added to bring the total lots of shells in the collection to 598, and before her retirement Fran Wagner completed an illustrated catalogue covering aerial distributions and synonomies of molluscan species from the Beaufort Sea, and much of the East Coast Continental Shelf of Canada. The mollusc collection data is now almost all filed on a computer data base.

A data base has been developed for Quaternary micropaleontologic and palynologic data, and substantial amounts of current and historic data have been entered.

In Saguenay Fjord, Charles Schafer has documented the relationship between river discharge variations (a proxy-climate indicator), anthropogenic activity and sediment texture for the period 1914-1976. A long core has been collected to extend this record back to the middle of the 18th century. Work has begun on similar proxy-climate investigations in Baffin Island fjords.

PERSONNEL NOTES

The subdivision now has a permanent staff of 14 scientists, 9 technicians and one secretary. In addition, during the year there have been three postdoctoral fellows and several term technical positions. Returning to the subdivision were Dr. Carl Amos (leave of absence with Woodward-Clyde) and Mrs. Cecilia Middleton (maternity leave).

Dr. Frances Wagner retired from the G.S.C. at the end of the year. Her expertise on Quaternary mollusca will be badly mised.

Dr. Jean-Pierre Guilbault (PDF) resigned in June 1982 to take a position with Gulf in Calgary.

Mr. Steve D'Appolonia and Mrs. Claudia Blakeney joined the subdivision in term technical positions.

Attendance at Meetings, Conferences, Courses

C.L. Amos

Eleventh International Congress on Sedimentology, International Association of Sedimentologists, Hamilton, Ontario, August 22-27, 1982.

Departmental Committee on Ocean Mining, Ottawa, Ontario, June 16-17, 1982.

S.M. Blasco

Canadian Society of Exploration Geophysicists, Calgary, Alberta, April 5-7, 1982.

SEPM-NORDA Research Conference on Seafloor Stability of Continental Margins, Bay St. Louis, Miss., October 12-15, 1982.

Geological Society of America, Annual Meeting, New Orleans, Louisiana, October 18-21, 1982.

Meetings with U.S.G.S., San Fransicso, California, January 10-15, 1983.

Arctic Waters Advisory Committee, Calgary, Alberta, March 7-9, 1983.

D.E. Buckley

First meeting of International Co-ordinating Committee of Seabed Working Group, N.E.A., Paris, France, May 3-5, 1982.

Second meeting of International Co-ordinating Committee of Seabed Working Group, N.E.A., B.I.O. Dartmouth, N.S., August 17-19, 1982.

Eleventh International Congress on Sedimentology, International Association of Sedimentologists, Hamilton, Ontario, August 22-27, 1982.

Third national meeting of Coastal Research Society of Peoples Republic of China, Xiamen, October 20-24, 1982.

R.E. Cranston

AECL Information meeting Winnipeg, Manitoba, May 24-27, 1982.

Eleventh International Congress on Sedimentology, International Association of Sedimentologists, Hamilton, Ontario, August 22-27, 1982.

Seabed Working Group Interim Meeting, Aix-en-Provence, France, September 1982.

U.S. Subseabed Program Annual Meeting, Denver, Colorado, November 1-5, 1982.

AGU Annual Meeting, San Francisco, California, December 1982.

France-Canada Collaboration Talks, Paris, Brest, France, March 1983.

D.L. Forbes

Joint Oceanographic Assembly, Halifax, August 1982

Eleventh International Congress on Sedimentology, International Association of Sedimentologists, Hamilton, Ontario, August 22-27, 1982

Invited to attend Indian and Northern Affairs meeting, Ottawa, Ontario, December 7, 1982

GSC Open House, Ottawa, Ontario, January 18-20, 1983.

Meeting on site selection for shorebase harbour development in Beaufort Sea, Hull, March, 1983

C.F.M. Lewis

Ice Scour Working Group Meeting, Calgary, Alberta, February 13-16, 1983.

P. Mudie

GSC Quaternary Discussion Group, Ottawa, Ontario, January 17-21, 1983

AASP/CIMP Symposium on Palynology of the North Atlantic Margin, Dublin, Ireland, September 1982.

D.J.W. Piper

Joint Oceanographic Assembly, Halifax, N.S., August 1982.

Eleventh International Congress on Sedimentology, International Association of Sedimentologists, Hamilton, Ontario, August 22-27, 1982

Workshop on fine-grained deep-water sediments, Halifax, N.S., August 17-19, 1982.

CCSS Steering Committee, Ottawa, Ontario, June 17, October 13 and December 1, 1982

C.T. Schafer

Joint Oceanographic Assembly, Halifax, N.S., August 1982

ROV'83 conference in San Diego, California, March 14-17, 1983

Annual Meeting of Working Group on Pt. Lepreau Environmental Monitoring, March 30, 1983

J.P.M. Syvitski

Joint Oceanographic Assembly, Halifax, N.S., August 1982

Eleventh International Congress on Sedimentology, International Association of Sedimentologists, Hamilton, Ontario, August 22-27, 1982.

Workshop on fine-grained deep-water sediments, Halifax, N.S., August 17-19, 1982.

R.B. Taylor

Eleventh International Congress on Sedimentology, International Association of Sedimentologists, Hamilton, Ontario, August 22-27, 1982.

ACROSES Workshop on Atlantic Coastal Erosion and Sedimentation, Halifax, N.S., November 25, 1982.

Sable Island Environmental Advisory Committee meetings April 28 and December 5, 1982

G. Vilks

12th Arctic Workshop, Amherst, Massachusetts, March 16-18, 1983.

Special Talks and Lectures

S.M. Blasco

"Seabed Permafrost and Sedimentary Processes - Beaufort Continental shelf". Invited speaker, Arctic Land Use Research, Toronto, Ontario, November 2, 1982.

"Sand, Gravel and Placer Resources of the Beaufort Continental shelf". Invited speaker, COGLA/DIAND Resource Sectors, Hull, Quebec, November 7, 1982.

"Beaufort Sea - Seabed Stability Issues and the Environmental Impact Statement". Invited speaker, DIAND Northern Environment Branch, DIAND, Hull, Quebec, November 8, 1982.

"Surficial Geology of the Canadian Beaufort Shelf and Slope". Presented at St. Mary's University, Halifax, N.S., November 17, 1982

"Geological and Geotechnical Constraints to Development in the Beaufort Sea" (open seminar: university/industry). Presented at University of Calgary, Calgary, Alberta, December 7, 1982.

"Surficial Geology and Engineering Implications to Offshore Development - Beaufort sea Continental shelf". Invited speaker, Atlantic Geoscience Society, Halifax, Nova Scotia, November 17, 1982.

"Late Quaternary Events of the Beaufort Continental Shelf and Relationships to Permafrost, Ice Scour, Seismicity, Shallow Gas and other stability issues". Invited speaker, Earth Physics Branch: Earth Science Seminar Series, Ottawa, Ontario, February 7, 1983.

"Beaufort Seabed Geology, Stratigraphic Model, Geological and Geophysical Constraints to Production Development and Structural Relationships to Deep Geology". Invited speaker, Gulf Resources and Dome Petroleum Ltd., Calgary, Alberta, February, 17, 1983.

"Geological, Geophysical and Geotechnical Instrumentation used to study Continental shelves and slopes". Presented at University of Calgary, Calgary, Alberta, March 7, 1983.

"Sediment Dynamics on the Beaufort Shelf". Invited speaker, Arctic Waters Advisory Committee, Calgary, Alberta, March 9, 1983.

D.E. Buckley

"Deposition and Early Diagenesis of Sediments in the Distal Sohm Abyssal Plain". Presented at Eleventh International Congress on Sedimentology, I.A.S Hamilton, Ontario, August 27, 1982

"International Projects in Marine Sciences at the Bedford Institute of Oceanography". Presented at Headquarters of National Bureau of Oceanography, Beijing, People's Republic of China, September 12, 1982

"Marine Geochemistry of the Deep Sea Sediments"; Presented at First Institute of Oceanography, N.B.O. Quindao, People's Republic of China, September 17, 1982

"Marine Environmental Research". Presented at:
Nanjing University, Nanjing; September 20, 1982
Second Institute of Oceanography, N.B.O., Hangzhou; October 10, 1982
Third Institute of Oceanography, Xiamen, November 20, 1982
South China Sea Institute of Oceanology, Guangzhou, People's Republic of China, December 14, 1982

The following series of nine lectures were presented at both the Second Institute of Oceanography and the Third Institute of Oceanography, N.B.O. in Hangzhou and Xiamen, People's Republic of China during the months of October, November and December, 1982:
"Multidisciplinary Project Design and Conduct"
"Objectives and Goals for Multidisciplinary Projects"
"Human and Technical Resource Management"
"Field Methods for Marine Geoscience"
"Laboratory Methods for Marine Geoscience"
"Controlling Accuracy and Precision in Geochemical Results"

"Interpreting and Using Multidisciplinary Scientific Results"
"Developing Predictive Models from Project Results"
"Publishing Reports from Multidisciplinary Projects"

"Techniques in Presenting Scientific Lectures and Seminars". Presented at Third Institute of Oceanography, N.B.O., Xiamen, People's Republic of China, December 7, 1982

"Estuarine Sedimentology and Geochemistry" presented at:
Second Institute of Oceanography, N.B.O., Hangzhou, October 12, 1982;
Third Institute of Oceanography, N.B.O., Xiamen, December 4, 1982;
South China Sea Institute of Oceanology, Guangzhou, People's Republic of China, December 15, 1982

"Problems in Coastal Sedimentology Research in Canada" presented at Third National Meeting of Coastal Research Society of People's Republic of China, Xiamen, People's Republic of China, October 22, 1982

R.E. Cranston

"Abyssal Plain Pore Water Modelling". Presented at Department of Oceanography, Dalhousie University, Halifax, N.S., November 19, 1982

"pH as an Indicator of Depositional Diagenetic Changes in Sediments from the Sohm Abyssal Plain". Presented at IAS Congress, Hamilton, Ontario, August 13, 1982

"Diagenetic Manganese Carbonate Formation in Sediments off Cape Mendocino, Ca.". Presented at AGU Meeting, San Francisco, California, December 1982

D.L. Forbes

"Sources of Contributing to Harbour Shoaling at Pte Sapin, New Brunswick". Presented at ACROSES-sponsored Workshop on Atlantic Coastal Erosion and Sedimentation, Halifax, N.S., November 1982

State-of-Art summary of Beaufort Sea coastal zone processes. Presented at DIAND, Hull, Quebec, December 1982.

Poster and video display on AGC activities and and time-lapse RALPH films of the seabed, with commentary, at GSC Current Activities Forum; Ottawa, Ontario, January 1982.

C.F.M.Lewis

"Ice Scouring and Sediment Dynamics for Grand Bank near Hibernia". Presented at Second Canadian Conference on Marine Geotechnical Engineering, June 8-11, 1982.

"The Distribution and Slope Variability of Iceberg Scour Marks o Eastern Canadian Continental Shelves". Presented at Joint Oceanographic Assembly, Halifax, N.S., Poster Session, August 2-13, 1982.

"Drift Ice Scouring on the Canadian Beaufort Shelf". Presented at International Congress on Sedimentology, Hamilton, Ontario, August 22-27, 1982.

"Methods to Detect Seabed Ice Scours and to Estimate Frequency of Ice Scouring". Presented at Seminar on Iceberg Management, Memorial University, St. John's, Newfoundland, November 8-10, 1982.

P.J. Mudie

"Dinoflagellate Distribution & Quaternary Glacial-interglacial Records in the Northwest Atlantic and Baffin Bay". Presented to AASP/CIMP Symposium on Palynology of the North Atlantic Margin, Dublin, Ireland, September 14, 1982.

"Paleo Transfer Functions" invited speaker at Micropaleontology Seminar, Dalhousie University, Halifax, N.S., November 25, 1982.

"Pollen and Red-Tide Dinoflagellates: Paleoecological Records in The Marine Environment". Invited speaker at GSC Quaternary Discussion Group, Ottawa, Ontario, January 18, 1983.

D.J.W. Piper

"Quaternary Growth Patterns of The Laurentian Deep-sea Fan". Presented at IAS, Hamilton, Ontario, August 1982.

"Turbidity Current Flow and Turbidite Geometry on the Continental Margin". Invited presentation, JOA, Halifax, August 1982.

"Slumps and Debris Flows on the Laurentian Fan: Fact and Fiction". Presented at GAC Annual Meeting, Winnipeg, Manitoba, May 1982.

Series of lectures in Geology 421 (5 lectures) and Oceanography 511B (2 lectures) at Dalhousie University, and in Geology 200 (3 lectures) at St. Mary's University; Halifax, N.S.

C.T. Schafer

"Quaternary History of Eastern Canada". Invited lecture, Department of Geology, Dalhousie University, Halifax, N.S., March 8, 1982.

"Geological Processes and Late Quaternary Paleoceanography, N.E. Newfoundland Slope". Presented at Department of Geology, University of South Carolina, Columbia, South Carolina, March 16, 1982.

"20th Century Sedimentation Events in the Upper Saguenay Fjord, Quebec". Presented at IAS, Hamilton, Ontario August 22-27, and Canadian Climate Centre, August 23, 1982.

"Sedimentation Rates During Glacial and Interglacial Intervals; Northeast Newfoundland Continental Slope and Rise". Presented during Deep Sea Sediments Session, IAS, Hamilton, Ontario, August 24, 1982.

"Slope Environments". Presented at Micropaleontological Seminar Series, Dalhousie University, Department of Geology, Halifax, N.S., December 16, 1982.

J.P.M. Syvitski

Eleventh International Congress on Sedimentology, International Association of Sedimentologists, Hamilton, Ontario, August 22-27, 1982.

Joint Oceanographic Assembly, Halifax, N.S., August 1982.

Workshop on fine-grained deep-water sediments, Halifax, N.S., August 17-19, 1982.

R.B. Taylor

"Seasonal Shoreline Change Along Forchu Bay and Framboise Cove, Nova Scotia - A Comparison Between Exploited and Natural Beaches". Presented at NRC ACROSES Workshop on Atlantic Coastal Erosion and Sedimentation, Halifax, N.S., November 25, 1982

"Arctic Coasts" lecture to Marine Geology 431B at Dalhousie University, Halifax, N.S., February 14, 1983

G. Vilks

"Late Pleistocene - Early Holocene Sedimentation and Peleoceanography off Eastern Canada". Presented at Institute of Oceanography, McGill University, Montreal, Quebec, November 11, 1982

Membership on Committees

S.M. Blasco

Chairman, Joint APOA/government Beaufort Sea Seabed Synthesis Ad Hoc Working Group.

Member, Joint APOA/government Ad Hoc Working Group on Permafrost and Hydrates Research.

Member, Joint APOA/government Ad Hoc Working Group on Ice Scour Research.

Chairman, NEP-OERD Offshore Geotechnics Program

Member, NEP-OERD Marine Engineering Program Technical Advisory Committee.

Technical Advisor, Arctic Waters Advisory Committee (DIAND).

Member, Local Arrangements Committee, Second Canadian Conference on Marine Geotechnical Engineering, June 7-11, 1982, Dartmouth, N.S

D.E. Buckley

Member, BIOMAIL, Technical Review of Industrial Research Proposals

Member, Miramichi Channel Dredging Advisory Committee

Member, Organizing Committee for International Association of Sedimentologists Congress for 1982

Chairman, Theme 10 Environmental Sedimentology, IAS Congress '82

Representative, Regional Committee on Problems in Long Range Transport of Air Pollutants

Member, BIO Chemical Safety and Radioisotope Committee

Member, Nuclear Energy Agency, Seabed Working Group - International Co-ordinating Committee

Member, Site Selection Task Group, NEA-SWG

Member, Regional Environmental Emergencies Team

R.E. Cranston

Canadian Delegate, Nuclear Energy Agency - Seabed Working Group

Member, BIO Library Committee

Member, Interdepartmental Laboratory Co-ordinating Committee for Atlantic Region

IAS Symposium Chairperson

D.L. Forbes

Member, National Research Council, Associate Committee for Research on Shoreline Erosion and Sedimentation (ACROSES)

C.F.M. Lewis

Member, NRC Subcommittee on Marine Geotechnical Engineering

Member, NRC (U.S.A.) Marine Board Committee on Arctic Seafloor Engineering

Member, Joint Industry/Government Working Group on Ice Scour Research

P.J. Mudie

Member, Canadian Geoscience Council Committee on Canadian Quaternary Geoscience

Chairman, Paleoclimates and Glacial History Session, 6th International Palynological Conference, Calgary 1984

Member, Steering Committee, American Association of Stratigraphic Palynologists, Boston Meeting 1986

D.J.W. Piper

Member, Intergovernmental Environmental Advisory Committee on Annapolis Tidal Power

Member, Canadian Coastal Sediment Study Steering Committee

Member, Geological Association of Canada Council (to May 1982) and Co-Chairman Special Projects Committee

Chairman, Atlantic Provinces Council on the Sciences Geology Committee

Member, COMFAN (Committee on deep-sea fans)

Member, Canadian National Committee for INQUA

Editoral board member for Sedimentology, Geomarine Letters, and Canadian Journal of Earth Sciences

K.R. Robertson

Member, College of Cape Breton, Environmental Technology Advisory Committee

Member, College of Cape Breton, Chemical Technology Advisory Committee

Member, BIO Laboratory Safety Committee

C.T. Schafer

Member, Organizing Committee - Third North American Paleontological Convention

Member, Expanded Regional Ocean Dumping Advisory Committee

Member, Working Group for Point Lepreau Environmental Monitoring

Member, Facilities Committee, Joint Oceanographic Assembly (Halifax, August 1982)

Member, Organizing Committee - Benthos '83, Second International Symposium on Benthonic Foraminifera (Pau, France, April 1983)

Member, Scientific Reading Committee, Benthos '83

AGC Representative, Nova Scotia Climate Advisory Committee (AES)

J.P.M. Syvitski

Chairman, International Association of Sedimentologists Fjord Symposium

Member, BIO Fish Lab Committee

Chairman, SAFE planning meeting/Symposia BIO Feb. 24-25

R.B. Taylor

Chairman, Terrain Subcommittee of Sable Island Environmental Advisory Committee

Member, Non-Renewable Resources Team, RADARSAT Project

G. Vilks

Canadian Representative, Nuclear Energy Agency, Seabed Working Group

LABORATORY STATISTICS

Sieve & Pipette Analyses	385
Automated Settling Tube Analyses	496
Coulter Counter Analyses	414
X-Ray Diffraction samples	193
X-Radiographs of Sedimentary Cores	1,900
Organic Carbon Analyses	2,700
Ocean Dumping Permits processed	103

SUBDIVISION MANUSCRIPTS

The Subdivision staff produced 38 outside papers, 5 G.S.C. Open File Reports, 15 "abstract only" manuscripts, 1 review and 1 book.

PROGRAM SUPPORT SUBDIVISION

K.S. Manchester

The objectives of the Program Support Subdivision are directed towards providing an efficient central technical support facility for the Division. This support is organized in three sections.

The Data Management Section is responsible for co-ordinating the requirements and planning the efficient use of the Institute computer facilities by Division staff. It is responsible for assisting in the maintaining of permanent data files for the Division's research purposes and filling individual requests for data. Special programs and data file catalogues and output routines are produced and maintained for AGC use.

This section also, in co-operation with Research Management and Conservation Branch, provides curation for the Division for core, dredge, grab and other marine geological samples. It also manages a contract for routine soft sediment analysis for the Division and provides a regional sample repository for marine geological samples collected by University and Industrial concerns that are donated to the Division.

The Marine Geoscience Technical Services Section is responsible for providing, operating and maintaining all the marine geoscience, geophysical, seismic refraction and reflection instruments, side scan sonar survey systems, and magnetic and gravity instruments as well as marine geological sampling equipment such as pistons, gravity, rock and vibrocorers; Shipek, Van Veen and Echman grab samples and rock dredges. This section also provides the Divisions primary logistic and storage support for all field projects and equipment by providing field vehicles, ATV's trailers, launches, boats and freight and laboratory containers.

The Marine Geoscience Instrument Development Section is responsible for developing, designing, and testing equipment and instruments or updating and/or modifying present instruments and equipment to meet new or special Division's specific objectives. This is accomplished by initial discussions with Division staff as to requirements, formulating proposals to meet the requirements, the designing, constructing, documenting and testing of these in the field to ensure they meet the desired requirements.

Highlights

1. RALPH was deployed on Sable Island in April. It tipped over and gave little data. It was re-deployed in July for 2 weeks and gave excellent data. It was then deployed in Beaufort Sea in September. The data has problems, but some of it seems acceptable. A second electro-magnetic current meter was added. This makes calculation of current shears possible.

2. Six Ocean Bottom Seismometers were used on a British ship by Dalhousie University in what appears to be a very successful experiment to study the Kane Fracture Zone using both active and passive seismics. We now have 8 OBS's ready for the field season 1983. The ninth will soon be ready. All are upgraded for 28 day continuous recording and full ocean depth by the addition of new tape recorders.

3. A successful workshop on Ultrasonic Profiling Suspended Sediment was co-chaired by Heffler at AGC. This will lead to the development of an instrument useful both in the lab and in the field.

4. A preliminary study of quantitative shape analysis of microforams has been started. A project in this exciting new field is about to begin. The required hardware has been ordered.

5. The development of a method for recording and playback of N.B.S.'s' I.R.G.B. coded time signals on seismic tapes, at logging speed and at sixteen times logging speed was successfully completed.

6. A large heavy duty IKU type grab sampler was acquired and used very successfully for sampling hard sand and gravel deposits off Labrador on HUDSON 1982 cruise.

7. The BIO Rockcore drill was used on the eastern Baffin Island Shelf off HUDSON using contract drill operators for the first time. This practice will continue in 1983, or as long as it is successful.

8. During the year, a large effort was successfully carried out getting equipment prepared for the CESAR operation. This included over 10 tons that was shipped to Resolute in July via the Sea Lift plus a large additional amount prepared in January/February 1983 which was shipped by Air Freight.

9. A very successful equipment test and survey cruise was carried out in June 1982 on CSS HUDSON. On this cruise, we successfully mapped two areas of the Nova Scotian Slope using the SEAMARC I system supplied by Lamont-Doherty Geological Observatory. We successfully tested new towing booms on HUDSON for towing multiple large airguns for LASE type experiments. We carried out successful trials of the new KSS-30 Sea-Gravimeter system. In conjunction with the CHS, UNB and Shell Tech Ltd., we operated successfully for periods during the day using GPS navigation.

10. An AGC originated PILP project of NORDCO Ltd., St. John's, Newfoundland, designed a new core sampling system for water depths up to 600m. It will be built and tested in 1983, and, if successful, will allow collection of undistributed samples of all types of unconsolidated sediments to 6 meters depth with the capability of then drilling up to 6 more meters in the bedrock beneath the sediment/bedrock interface.

11. AGC is getting into the deep towing operation in a big way. In 1982, we towed off HUDSON using the present Pengo winch on the foredeck with success, but also many limitations. To overcome these limitations, AGC has developed a performance specification for a winch to hold up to 10,000 meters of 0.70" dia. cable or lesser amounts of larger cable. The winch was ordered from Timberland Equipment Ltd. of Woodstock, Ontario and will be delivered in May 1983 for installation on the stern of HUDSON. To accomodate the new winch, AGC carried out major deck strengthening work and helicopter deck removal work on HUDSON's stern during March 1983. The SEABED II program has ordered a large pedestal crane that will be located on HUDSON along with the winch to handle the depth tow equipment and lead the deep-tow cable over the side. Both the winch and crane are designed for portability and can be put on other large ships even though the winch and cable weigh nearly 25 tons and the crane 7 tons. With the above winch acquisition, it will allow the BIO Rockcore Drill to be used on other ships as this winch is also designed for that purpose. The acquisition of these two units has given us the ability to carry out deep-tow operations to 6000m depths when a longer cable is acquired. At present, we are limited to 3000m as we are using a 5000m drill cable belonging to Dalhousie University for this purpose.

12. The Subdivision supported AGC cruise projects on six different ships with up to fourteen cruises plus coastal field projects in areas from the Beaufort Sea, Eastern Arctic, Nova Scotia Shelf, Slope area, and Nares Abyssal Plain with an excess of 800 PSS person/days spent in the field in support.

13. Information System Development

- Design of a revised navigation database was completed and implimentation started. Design of new graphical display software for working map production was in final stages of preparation.

- Rangechart production from the biostratigraphy data has been made fully operational and development of Shaw's graphic method was nearing completion.

- KREMP database for palynology was transferred to the EMR computer in Ottawa for use by all of GSC.

- A database and report writer programs were developed for the Quaternary biostratigraphers.

- A proto-type Coastal Information System was designed and partially implimented.

- New statistical analysis software was designed and implimented for the processing of grain size data.

14. Curation

- The cataloguing of all sample material collected prior to 1982/83 was completed this year.

Memberships on Committees

K. Manchester

BIO Ship Users Committee

A. Sherin

BIO Computer Users Advisory Committee
BIO Computer Graphics Subcommittee

M. Gorveatt

AGC Safety Committee
BIO Ships Subcommittee

D. Heffler

Side Scan Mosaics Committee

Personnel Notes

The Subdivision presently consists of 4 professional, 15 technical and 3 support staff members.

Attendance at Meetings, Conferenes and Courses

D. Heffler
First Aid Course
Co-Chaired Workshop C^2S^2
Workshop on Quantative Stratigraphy
On a Panel - 2nd Marine Geotechnical Conference
OBS, Santa Barbara
Society of Motion Picture and Television Engineers

K. Manchester Cable Connector Workshop, Boston

A. Fricker
ASTUTE Austin, Texas
ASTUTE Reno Nevada
Data Dictionary, Austin, Texas
Data Dictionary, Chicago
Environmental Coastal Mapping, Halifax
Design Course, Yourden/DeMarco
Presented a Teachers Workshop at BIO

Special Talks and Lectures

D. Heffler "RALPH" at Society of Motion Picture and Television Engineers meeting.

K. Manchester BIO Deep Towing Winch Investigation

A. Fricker Presented a paper User Access to System 2000 at ASTUTE in Reno, Nevada.

CENTRAL LABORATORIES AND TECHNICAL SERVICES DIVISION

J.A. Maxwell, Director

The objects of the Division are

1. To provide chemical, mineralogical and technical support (data, advice, assistance) as required for Branch scientific projects, and occasionally for other projects and organizations, through the development and operation of chemical and mineralogical laboratories, and instrument development and electronic services unites;

2. To develop and maintain, by means of on-going research and development on methods and instrumentation, an up-to-date capability to provide the expertise required;

3. To carry out mineralogical research studies on minerals and on selected mineral deposits, independently or in collaboration with other geoscientists;

4. To provide mineralogical information to the Canadian public through the preparation and sale of sets of rocks and minerals, the examination of specimens submitted by the public, the preparation and publication of guidebooks to Canadian mineral areas as an aid to mineral collectors and tourism, and mineralogical advice as required.

The scientific support and research facilities of the Division include chemical, X-ray fluorescence and atomic absorption spectroscopic, optical emission spectrographic, electron microprobe, scanning electron microscope and X-ray diffraction laboratories, together with those for sample preparation and mineral separation.

Earth science reference standards play a major role in reseach studies and the Division is responsible for the curation of the Systematic Reference Series of the National Mineral Collection, the National Meteorite Collection and the Geological Survey of Canada Rock Collection, as well as for the maintenance of a library of X-ray powder diffraction patterns of minerals. The Division has also taken a leading role in the study and certification of international standard reference materials for chemical analysis.

The Technical Services Section, through its Instrument Development Shop and Electronics Laboratory, provides a wide variety of services to Branch projects, including the extensive fabrication of specialized field equipment.

Division Administration

Administrative, financial and personnel requirements are handled by the Director, one Senior Clerk and an Administrative Officer shared with the Economic Geology Division. Part-time stenographic and clerical assistance is provided by Mrs. Jocelyne Watson, Analytical Chemistry Section.

Membership on Committees

J. A. Maxwell

Branch Management Committee
Branch Official Languages Coordinator
Canadian Geoscience Coordinator Canada/Federal Republic of Germany Scientific & Technical Cooperative Agreement.
Departmental Committee on Energy Conservation
EMR Project Team (Energy Specialists)
Treasury Board Management Team, PC Contract Bargaining Sessions
Branch Strategic Review Committee on Interdisciplinary Cooperative Work.

Analytical Chemistry Section

G.R. Lachance

The various analytical techniques used to provide compositional data range from a number of classical chemical methods for unusual samples to instrumental techniques such as atomic absorption (flame and graphite furnace); infra-red, optical emission (direct reading and photographic), X-ray fluorescence (wavelength and energy dispersive) spectrometry. As much as possible, instruments are programmed to provide a suite of elements automatically with a minimum of operation input. Conversely, some method development must be carried out, often concurrently with request for analyses of materials for which the Section does not have established methods.

Highlights

- a graphite furnace and an automatic sample chamber attachment were acquired for the new Varian atomic absorption spectrometer and both are receiving much use;
- two reports "Studies in standard samples of silicate rocks and minerals, 1969-82", and "Four Canadian iron-formation samples prepared for use as reference materials" were submitted for publication in the Paper Series by Sydney Abbey prior to his leaving the Branch as of March 31, 1983.
- G.R. Lachance was invited by the People's Republic of China to give a series of lectures, seminars and laboratory demonstrations on the Analysis of Geological Materials by X-ray Fluorescence Spectroscopy methods, in Beijing and Shanghai, October 1-November 5, 1982.
- Mr.Yang Junhao, People's Republic of China, was a Visiting Scientist in the Section until February, when he transferred to CANMET for the second year of his posting to Canada.
- Dr. R.M. Rousseau presented two papers on X-ray fluorescence spectroscopic analysis, in Denver, and Dr. J.G. Sen Gupta one paper on the determination of the rare earth elements, in St. Jovite.

Personnel Notes

René Guillas left the Section to accept a position with CANMET (May).
Suzanne Laplante's term of employment ended in August.
Richard Faulker and Paul McManus joined the staff in January.
Denis Rioux joined the staff as a term employee in March.

Attendance at Meetings, Conferences and Courses

P.G. Belanger
Joint Labour Management Health and Safety Course, Ottawa, March 1983.

W.H. Champ
29th Annual Conference of the Spectroscopy Society of Canada, St. Jovite, Quebec, Sept. 26-29, 1982.

K.A. Church
Performance Review and Appraisal Workshop, Ottawa, December 1982,

G.R. Lachance
Two-week session as an invited resource person, X-ray clinic, State University of N.Y., Albany, Classification for Managers Course, EMR, Ottawa, Feb. 1983.

R.M. Rousseau
Workshop and 31st Annual Conference on Applications of X-ray Analysis, Denver, Col., Aug. 2-6, 1982.

J.G. Sen Gupta
29th Annual Conference of the Spectroscopy Society of Canada, St. Jovite, Que., Sept. 26-29, 1982.

C. Veys
Computer Concepts, EMR, Ottawa, March 1983.

J. Watson
Financial Administration, Level 1, Hull, March 1983.

Membership on Committees

W.H. Champ
Editorial Committee, Canadian Journal of Spectroscopy

J.G. Sen Gupta
Branch Safety Committee
United Way Campaign Canvasser

J. Watson
United Way canvasser
Christmas Party Committee

Special Talks and Lectures

G.R. Lachance
Lectures and Seminars in various institutes of the People's Republic of China on X-ray Fluorescence Analysis in general and geological materials in particular. This was under UN Project CPR/80/046. Oct. 3-Nov. 5.

R.M. Rousseau
"Theoretical Basic Concepts in X-ray Fluorescence Analysis, Fundamental Algorithm between Concentration and Intensity and Fundamental Alpha Correction Coefficients Part I", and "Quantitative XRF Analysis with Fundamental-Parameters Calculations, Part II, 31st Annual on Applications of X-ray Analysis, Denver, Colo., Aug. 5.

J.G. Sen Gupta

"Graphite Furnace Atomic Absorption Determination of Scandium, Yttrium and Rare Earth Elements in Silicate rocks after a Cation-Exchange Chromatographic Separation", 29th Annual Conference, Spectroscopy Society of Canada, St. Jovite, Que., Sept. 29.

Manuscripts

Manuscripts for 2 GSC papers and 3 papers for outside journals were approved for publication by the Division.

Studies of Standard Samples

Although Mr. Sydney Abbey retired as Head of the Section on December 31, 1981, he continued to work on a part time basis during all of the fiscal year to complete two items of work already underway. The first involved the tabulation and evaluation of results received from 32 collaborating laboratories on four Canadian iron-formation samples in order to compute and publish the "usable values" for as many major, minor and trace constituents as possible; the second is a general study of the preparation and analysis of standard samples of silicate rocks and minerals and, of the role played by GSC in this field during the years 1969-1982. Two manuscripts have been completed and approved for publication as GSC papers.

Laboratory Notes

Chemical Laboratories

The analytical services component continued to provide on a regular basis quantitative data for CO_2, H_2O, S, FeO,C, Cl on most samples submitted. Cu,Pb, Zn,Co,Ni and on occasion Cr,V,Li, are provided by atomic absorption on approximately half of the samples submitted. Although the number of samples completed increased by 400 over the previous fiscal year, the backlog of samples on March 31 stood at 3000, an increase of 1000 from the previous year. This high carryover is due in part to two unstaffed positions for the major part of the year.

The development and special analyses component was again faced with requests for an increasing number of non-routine analyses, for example: carbonates, massive sulphides, arsenides, barites, anhydrites, ferromanganese, lake deposits, etc. In many cases this involves a return to classical or neo-classical techniques and requires a number of natural and/or snythetic reference materials in order to assess the validity of results obtained using modified methods.

It is expected that a significant step was taken in extending both the number of elements analyzed and the lower limit of detection by the acquisition of a graphite furnace and automated sample feeder for the Varian atomic absorption spectrometer. Combined with a pre-concentration ion-exchange method developed during the year, it is expected that output can be doubled (~100 samples/analyst/year for the determination of all the elements of the rare-earth group.

Representatives of the unusual samples that were submitted and analyzed during the year are:

- 60 samples ranging from silicate to major sulphides (pyrite, chalcopyrite, galena, sphalerite) for complete analysis.

- 30 samples ranging from silicates to major concentrations of pyrite, arsenopyrite,...for complete analysis.
- 200 samples of complex lake bed deposits (ferromanganese, hydrated iron and manganese oxides, ...) for complete analysis.
- 249 samples of silicates and other miscellaneous geological materials (sodium sulphate, sphalerite, ...) for complete analysis.
- a number of miscellaneous minerals (anhydrites, synthetic glasses with ~1% U, La, Ce..).
- approx. 200 samples of silicates with up to 20% F, 0-2% Bi,Mo,Sn,W for complete analysis.
- 200 samples of silicates with significant concentrations (0-10% F,Pb,Zn; 0-2% Sn,U,Be,As,W) for complete analysis.

Optical Emission Spectrographic Laboratory

The necessary realignment of the optics on the semi-automated direct reading spectrometer (which provides the bulk of the trace data by optical emission techniques) coupled with the perennial problems of temperature and humidity controls, resulted in this instrument being available for only half of the year for providing analyses. This resulted in a temporary transfer of some analytical work to other techniques.

The development work carried out was oriented towards: (a) a general semi-quantitative method for the analysis of almost any geological material for up to 50 elements.
(b) a method specific to the analysis of iron-formation type samples.
Both methods are based on identifying and measuring line intensities on photographic plates manually, thus the accent is on versatility rather than productivity. Generally, if approximately 15 to 25 elements are determined, productivity is in the range of 400-500 samples/analyst/year.

X-ray Fluorescence Laboratory (XRF)

The XRF laboratory had its share of problems, e.g. excessively high room temperatures on a number of occasions, spectrometer component breakdown, electrical line fluctuations, etc.; coupled with an unstaffed technical position for seven months of the year. By working staggered hours, etc. the number of samples processed was almost equal to that of the previous year. The net result is that the backlog of samples to be analyzed as of the beginning of the last three fiscal years has gone from 1200, to 1900 and to 2600, respectively.

As part of the R&D component, R. Rousseau in addition to presenting two papers on XRF (theory and practice) at the Denver Conference and submitting the manuscripts for publication as previously mentioned
- provided tables of alpha coefficients for three laboratories (UK,Canada,USA).
- assisted Mr. Abbey by writing programs for computing "usable values" on reference materials using both statistical concepts and the selected laboratories approach.
- wrote or updated programs for the calculation of CO_2,H_2O,S (infra-red), for selecting mixtures in the preparation of daily calibration standards.
- wrote and updated programs for the computation of alpha coefficients, for data reduction of wavelength and energy dispersive XRF data.

A summary of the samples processed by the Section and of the allocation of these samples to the three laboratories are given in the following table. For comparison purposes, the totals for the current and previous fiscal year (FY-1) are presented.

Production Statistics FY 1982-83
Number of Samples Processed

	Submitter								
Section	CLTS	Cord G	Econ G	Prec G	RGG	TS	Other	Total	FY-1
Carried over	24	66	1096	1132	159	0	17	2494	1571
Rec'd during FY	115	152	1126	2006	1358	236	144	5137	4587
Rept'd during FY	92	83	916	2245	448	136	79	3999	3777
Carried forward	47	135	1306	893	1068	100	83	3632	2381
Chem. Labs.									
Carried over	24	66	787	1070	29	0	10	1986	1201
Rec'd during FY	96	152	1510	1402	1508	236	144	5048	4301
Rept'd during FY	84	208	1208	1710	472	136	154	3972	3516
Carried forward	36	10	1089	762	1065	100	0	3062	1986
Optical Spec.									
Carried over	24	10	970	721	0	0	7	1732	1274
Rec'd during FY	55	114	299	1092	416	17	89	2082	2511
Rept'd during FY	68	28	968*	1247	86	17	27	2441*	2016
Carried forward	11	96	301	566	330	0	69	1373	1769
XRF Lab.									
Carried over	24	66	595	1124	145	0	10	1964	1201
Rec'd during FY	96	152	884	1325	1141	17	139	3754	3864
Rept'd during FY	84	83	697	1586	470	17	135	3072	3126
Carried forward	36	135	782	863	816	0	14	2646	1939

*excludes 625 cancellations.

Technical Services Section

R.J. Thibedeau

This Section is responsible for the design, fabrication, modification and maintenance of equipment in support of Branch laboratory and field projects and operations.

Highlights

Among the many jobs completed by the Section in support of Branch field and laboratory projects, the following items, all of which were successfully tested, are of particular note:

- construction of a dry ice lake core sampler which allowed removal of a frozen sample in a minimum of time, thus permitting re-use of the apparatus;
- design and fabrication of a manually-operated portable, longitudinal core-splitter;
- design and construction of vacuum storage chambers for the stages of the scanning electron microscope;
- design and construction of an adjustable slit and holder for a mass spectrometer;
- development and construction of a bore-hole IP probe, with high pressure connections and ball joint fittings;
- fabrication of an adjustable manuscript holder for light tables in cartography.

Statistics

Instrument Development Shop

Work orders received during 82/83	205
Work orders carried over from 81/82.....	43
Total on hand during 82/83.....	248
Cancellations during 82/83.....	6
Work orders contracted out.....	2
Net amount	240
Work orders completed during 82/83.....	184
Work orders to be carried into 83/84.....	56

Electronic Shop

Work orders received during 82/83.....	30
Work orders carried over from 81/82.....	10
Total on hand during 82/83.....	40
Cancellations during 82/83.....	1
Net amount	39
Work orders completed during 82/83.....	29
Work orders to be carried over into 83/84..	10
Combined total completions.....	213

Instrument Development Shop - Work load completed by Division:

RGG.....	21.3%
CLTS.....	20.2
TS.....	19.3
PREC.....	18.0
EG.....	3.1
GID.....	3.0
Admin.....	1.1
ISPG.....	0.9
DGO.....	0.3

In comparison with 81/82, the percentage share of work completed decreased again for CLTS and increased for RGG, TS and Precambrian Divisions.

It should be noted that 453 overtime hours were worked during this fiscal year from Nov.82 to March 31, 1983.

The time spent on emergency repairs and maintenance (i.e. not covered by a requisition) amounted to 12%. This is the total for electronic and instrument shops.

Mineralogy Section

A.G. Plant

The Mineralogy Section provides the facilities and expertise for mineralogical studies in support of many Branch projects. These include the specialized fields of X-ray diffraction, crystallograpy and electron microbeam analysis (electron microprobe and scanning electron microscope). The Section also provides sample preparation and mineral separating services; curation of major collections of rocks, minerals and meteorites; liaison with and assistance to mineral collectors; preparation and sale of rock and mineral collections; and a free service of mineral identification and information for use by the public.

Highlights

- major renovations to the laboratories on the 7th floor were completed at the end of March. These renovations provide a new X-ray diffraction laboratory, with associated darkroom, and a completely renovated area for the electron microprobes and scanning electron microscopes. The changes also incorporate a number of features to assist a handicapped employee.
- 137 requisitions for X-ray diffraction, electron microprobe analysis, scanning electron microscopy, petrographic studies and general mineralogy were completed during the year.
- mineralogical characterizations of two new minerals, kiddcreekite, Cu_6SnWS_8, from Kidd Creek Mine, Timmins, Ontario, and lapietite, $CuNiSbS_3$, from Lapie River area, Yukon, have been approved by the Commission on New Minerals and Mineral Names, International Mineralogical Association.
- as part of a study of ore deposits in the vicinity of Izok Lake, located in the northern part of the Slave structural province in the District of Mackenzie, N.W.T., a preliminary mineralogical study of the Gondor deposit, Kidd Creek Mines Ltd. was completed. The massive sulphide body consists principally of pyrite-sphalerite with variable galena and chalcopyrite.
- a computer program to improve the quality of analyses obtained with an energy dispersive spectrometer has been developed and successfully tested on the electron microprobe for a variety of common matrices. The program provides greater flexibility in element and parameter selection, gives the analyst access to background model and deconvolution factors, provides for future access to different matrix corrections, and plans are in preparation to adapt it for use on a scanning electron microscope.

- the quality and quantity of zircon concentrates prepared for geochronological research studies showed considerable improvement over previous years and fully supported the design of the renovated Wilfley Table and the adoption of the new preparation procedures.
- cataloguing of the Systematic Reference Series in the National Mineral Collection was completed during the year with an additional 1850 specimens being catalogued. This brings the total number of catalogued specimens to about 14 000.
- sales of Prospector's Sets of Rocks and Minerals amounted to 6030, an increase of 822 from 1981-82. Revenue from the sale of all sets and collections, payable to the Receiver General, was $24 245.00.

Personnel Notes

E.A. Darnley was appointed to a term position in September 1982 to assist in the curation of the mineral collection.
R. Gordon was appointed to a position in the Sample Preparation laboratories in September 1982 after holding a term appointment from May 1982 in the Reference Collection Facility at Tunney's Pasture.
R.K. Herd was appointed Curator, National Collections of Rocks, Minerals and Meteorites, February 1, 1983.
G.M. LeCheminant was appointed to a term position in July 1982 to undertake mineralogical studies in support of Branch projects.
A.L. Littlejohn resigned May 28, 1982 to accept a position with Vancouver Petrographic Limited.
B. Bilodeau, A. Marincak and E. McDougall were employed under the Summer Canada program, L. Radburn as a COSEP student, during the period May-September 1982.

Attendance at Meetings, Conferences and Courses

H,G. Ansell
- GSC Current Activities Forum, Ottawa, January 1983.
- Tucson Gem and Mineral Show, Mineral Museums Advisory Council meeting, and Mineralogical Society of America/Friends of Mineralogy Symposium, Tucson, Arizona, February 1983.

M. Bonardi
- Ottawa Valley Electron Beam Group, Ottawa, May 26, 1982,
- Computer Course on Introduction of BASIC, Computer Science Centre, Ottawa, May 31-June 4, 1982.
- Joint Meeting of Microbeam Analysis Society and Electron Microscopy Society of America, Washington, August 9-13, 1982.

E.A. Darnley
- GSC Current Activities Forum, Ottawa, January 1983.

D.C. Harris
- Ottawa Valley Electron Beam Group, Ottawa, May 26, 1982.
- International Mineralogical Association meeting, Varna, Bulgaria, September 1982.
- GSC Current Activities Forum, Ottawa, January 1983.

R.K. Herd
- Performance Review and Employee Appraisal Workshop (EMR sponsored), Ottawa, March 1983.

G.M. LeCheminant
- Seminar on Image Analysis, CANMET, Ottawa, Aug.82.
- GSC Current Activities Forum, Ottawa, January 1983.

A.G. Plant
- Staffing for Line Managers (EMR sponsored), Ottawa, May 4-5, 1982.
- Classification Course (EMR sponsored), Ottawa, May 13, 1982.
- Geological Association of Canada/Mineralogical Association of Canada Joint Annual Meeting, Winnipeg, May 17-19, 1982.
- Ottawa Valley Electron Beam Group, Ottawa, May 26, 1982.
- 29th Symposium of the Spectroscopy Society of Canada, St. Jovite, Quebec, September 26-29, 1982.
- Annual Meeting, National Research Council of Canada Associate Committee on Meteorites, Ottawa, November 1982.
- GSC Current Activities Forum, Ottawa, January 1983.
- meetings of the Executive of the Spectroscopy Society of Canada in Ottawa (June), St. Jovite (September) and Toronto (February).
- Meetings at University of Toronto to monitor progress in the establishment of the Ultra Sensitive Analysis Facility (Isotrace). April, May, December 1982, and February 1983.
- Joint Labour-Management Seminar on Health and Safety, Ottawa, March 5-9, 1983.
- Time Management Course, Ottawa, March 30, 1983.

A.C. Roberts
- Joint Committee on Powder Diffraction Standards meeting, Philadelphia, March 1-3, 1983.

A.P. Stenson
- Geological Association of Canada/Mineralogical Association of Canada Joint Annual Meeting, Winnipeg, May 17-19, 1982.
- Meetings of the Executive of the Mineralogical Association of Canada, Winnipeg (May) and Toronto (October).

- Joint Committee on Powder Diffraction Standards (Minerals Subcommittee), International Centre for Diffraction Data. Swarthmore, Pennsylvania, May and December 1982.

D.A. Walker

- Scanning Electron Microscopy Conference, Los Angeles, April 26-30, 1982.
- Ottawa Valley Electron Beam Group, Ottawa, May 26, 1982.
- Image Analysis Seminar, Microscopy Society of Canada, Dartmouth, May 29, 1982.
- Third North American Paleontological Convention (Invited Speaker), McGill University, Montreal, August 7, 1982.
- Image Analysis for the Study of Morphology, sponsored by International Correlation Programme, Ottawa, October 27-29, 1982.
- GSC Current Activities Forum, Ottawa, January 1983.

Membership on Committees

D.C. Harris
- Canadian representative on the Commission on New Minerals and Mineral Names, International Mineralogical Association.

A.G. Plant
- Canadian representative to NEA/IAEA project on "Uranium Favourability by Mineral Analyses".
- Organizing Committee for establishment of an Ultra Sensitive Analysis Facility (Isotrace) at the University of Toronto.

- Mineralogical Association of Canada representative on the International Mineralogical Association Commission on Cosmic Mineralogy.
- President, Spectroscopy Society of Canada, and Chairman, Microanalysis Group.
- Branch Management Standing Subcommittee on New Technology for Data and Information Acquisition and Processing.
- National Research Council of Canada Associate Committee on Meteorites.

A.P. Stenson
- Treasurer, Mineralogical Association of Canada.
- Member and Mineralogical Association of Canada representative, JCPDS-International Centre for Diffraction Data.

W.U. ter Haar Romeny
- Branch Safety Committee.

Special Talks and Lectures

D.C. Harris
- "Izok Lake massive sulphide deposit", International Mineralogical Association meeting, Varna, Bulgaria, September 1982.

D.A. Walker
- "Applications of Scanning Electron Microscopy in Paleontology", invited paper at Third North American Paleontological Convention, McGill University, Montreal, August 1982.
- "Applications of Scanning Electron Microscopy in the Geological Sciences", invited presentation to staff of Cambridge Instruments (Canada) Ltd., Montreal, January 1983.

Manuscripts

Manuscrips for 4 GSC papers and 8 papers for outside journals were approved for publication by the Division.

Laboratory Statistics

X-ray Diffraction and General Mineralogy

Studies were made in support of 59 Branch projects and outside agencies. X-ray diffraction analyses involved 1137 Debye-Scherrer camera mineral identifications; preparation of 55 reference standard patterns; use of the X-ray diffractometer to examine sulphide ores, clay minerals and concentrates. During the period of laboratory renovations (November 1982-March 1983), 173 X-ray identifications were completed at CANMET. Microscopic examinations and X-ray diffractometer analyses of 78 mineral concentrates were completed at the GSC in support of the radiometric age determination program. Studies in uranium were completed in support of 4 Branch projects for the Economic Geology Division and involved the preparation of 211 radioluxographs and several days of electron microprobe analysis. Petrographic, ore microscopy, electron microprobe and scanning electron microscope analyses were carried out in support of projects in RGG, Precambrian and EG Divisions.

Mineralogical studies of the ore minerals in the Gondor massive sulphide deposit located in the northern part of the Slave structural province in the District of Mackenzie, N.W.T., have been completed on several diamond drill cores. These studies have revealed that the sulphides consist principally of pyrite-sphalerite with variable galena and chalcopyrite. Other minerals in minor to trace amounts are marcasite, pyrrhotite, magnetite, freibergite, native silver, aurian silver, pyrargyrite, stephanite, stannite, native bismuth and rutile.

Mineral investigations of the minerals associated with igneous intrusions in the limestone quarries in the Montreal area continued with 4 visits to the Francon quarry, one to the nearby Miron quarry and one to the Varenne quarry. A paper describing the new species, franconite, was submitted for publication. Research continued on the Ca-analogue of franconite; two unknown minerals (possibly new species) were found during visits to Francon and research on them was initiated.

Sample Preparation and Mineral Separation

The productivity of samples prepared for chemical analysis is shown in the following table, together with sub-totals for each Division. This work resulted from 68 requisitions in support of 37 projects.

Productivity of samples prepared for chemical analysis

	PC	EG	RGG	CG	TS	Other	Total
Brought forward from 1981-82	53	201	0	0	0	10	264
Received during 1982-83	1128	914	109	67	78	88	2384
Completed during 1982-83	849	1105	109	67	78	98	2306
Carried forward to 1983-84	332	10	0	0	0	0	342

Sample preparation and mineral separation for geochronology included the following: 7 potassium-argon and 45 rubidium-strontium whole rock samples; 41 monazite , 40 biotite, 30 amphibole, 9 muscovite and 2 other mineral concentrates. This work resulted from 25 requisitions in support of Precambrian Division projects. In addition, there were 7 requisitions for 14 miscellaneous mineral concentrates.

Of special note is the fact that the quality and quantity of zircon concentrates prepared for geochronological research studies showed considerable improvement over previous years and fully supported the design of the renovated Wilfley Table and the adoption of the new preparation procedures. The installation of a new crusher and the acquisition of a new hydraulic breaker at year-end are expected to contribute to further improvements in preparation procedures.

Electron Microbeam Analysis

Analytical studies were provided by the electron microprobe and scanning electron microscope laboratories in support of 41 Branch projects and 4 projects that originated outside of the Branch, and required 2930 hours of instrument time. During the period from November 1982 to March 1983 when the laboratories were being renovated, we were able to operate at 50% capacity by transferring two of the instruments to temporary locations on the ground floor. This long interruption accounted for a lower productivity during the report period. As in previous years the analytical studies encompassed a very broad range of geological topics and included studies in economic geology, petrology, geochemistry, sedimentology, mineralogy, paleontology and the nuclear waste disposal program.

A computer program to improve the quality of analyses obtained with an energy dispersive spectrometer has been developed and successfully tested on the electron microprobe for a variety of common matrices. The program provides greater flexibility in element and parameter selection, gives the analyst access to background model and deconvolution factors, provides for future access to different matrix corrections, and plans are in preparation to adapt it for use on a scanning electron microscope.

Curation of Collections

Catalogued specimens added to the Systematic Reference Series of the National Mineral Collection totalled 123, including 31 species new to the collection. 53 bulk accessions were obtained, 7 of which represent samples collected by project personnel from localities in the Yukon. A large number of mineral specimens from the bulk accessions are currently awaiting identification before inclusion in the catalogued collection. The cataloguing of the Systematic Reference Series was completed during the year with an additional 1850 specimens being catalogued. This brings the total number of catalouged specimens to about 14 000. In support of research, 241 specimens were selected and provided in response to 42 separate requests, 26 from Branch personnel and 16 from other geoscience institutions, universities and industry. 17 exchanges of specimens were carried out with other institutions, collectors and mineral dealers. Consultative services on mineralogical and curatorial matters outside the Branch consumed about 3 man-weeks of time.

Maintenance and services of the Regional and Representative Rock Collections continued satisfactorily and at year-end, discussions were held with Public Works on the allocation of extra space at the Tunney's Pasture building which will allow for the future development of the collections under the direction of the new Curator appointed in February 1983.

Assistance to the Public

Mineralogical information provided to the public by the Curatorial Services Unit required the identification of 272 rock and mineral samples, with results being communicated in 37 written and 57 oral reports. Miscellaneous information related to minerals and rocks was provided by telephone or in person on 21 separate occasions.

Enquiries on minerals and mineral occurrences were received by Mrs. Stenson as follows: 64 office visits, 124 telephone calls and 30 letters. Specimens for identification were submitted on 56 occasions by collectors; this represents about 250 identifications.

Preparation of Rock and Mineral Sets

6030 Prospector's sets of Rocks and Minerals were prepared and shipped during the year, compared to 5208 in 1981-82. The distribution of these across Canada was as follows:

	1981-82	1982-83
Alberta	734	769
British Columbia	244	176
Manitoba	99	123
New Brunswick	19	66
Newfoundland	78	47
Nova Scotia	214	230
Northwest Territories	110	30
Ontario	994	1317
Prince Edward Island	4	8
Quebec	350	371
Saskatchewan	97	135
Yukon	182	230
GSC Offices	1574	1825
EMR Offices	370	560
Others	139	143

At the request of the National Film Board, 25 collections were supplied to accompany Earth Science filmstrip kits. Revenue from the sale of all sets and collections, payable to the Receiver General, was $24 245.00 ($28 707.00 in 1981.82). The decrease in revenue was due to the fact that there were no sales of the 120 specimen economic collection during the year as it was discontinued in February 1982 because of the need to update it and to have bilingual literature. A revised set was selected during the year, but budgetary restraints prevented a production run.

Special requests for specimens were filled for: National Museum of Natural Sciences; National Museum Mobile Exhibit; Canadian Unity Information Office, Mobile Exhibit; CANMET; Walter Kahn, Boyersoien, West Germany; and AECL, Pinawa, Manitoba. Displays were loaned to the Rock Hound Gemboree, Bancroft, Ontario and for the EMR display at Expo Quebec, where our geological Rock Map took centre stage.

Fieldwork was undertaken at 56 localities in British Columbia, Alberta, Saskatchewan, Manitoba, Ontario and Quebec. The work involved more than 30 000 km of travel by plane, boat and truck and the collection of 21 tonnes of minerals, rocks, ores and fossils.

CORDILLERAN GEOLOGY DIVISION

R.B. Campbell

The Cordilleran Division is responsible for geological studies in most of the Canadian Cordillera and the adjacent offshore regions. These studies are aimed at increasing the knowledge of the composition, age, distribution and origin of regionally mappable rock units to assess mineral and hydrocarbon potential, to guide mineral exploration and to aid in the planning of the orderly development of land utilization.

The Division includes a Marine Geology Section based at the Pacific Geoscience Centre, Sidney, Vancouver Island. Its scientists carry out stratigraphic, biostratigraphic, sedimentological and structural studies of the Pacific Continental Shelf and adjacent areas with particular emphasis on assessing hydrocarbon potential; seismic and magnetic studies in conjunction with investigations by the Earth Physics Branch to determine the disposition of shallow to deep crustal layers on the Pacific continental shelf and slope; terrain sciences projects dealing with surficial sediments in the offshore areas and geomorphic processes along the coasts to aid in coastal management. The Vancouver based part of the Division is involved in a broad spectrum of research in those parts of the Cordillera mainly southwest and west of the areas of major hydrocarbon potential. Therefore, emphasis is placed on projects that are important for mineral exploration and assessment. Complementary to a study of Tertiary and recent volcanism is investigation of geothermal sources in the Cordillera. The Division maintains an excellent research library which is open to the public and operates a Sales Office where Departmental publications and maps are available. Gross sales in F/Y 1982-83 were approximately $118,000.

Highlights

After 20 years and 9 field seasons field work on the original Coast Mountain Project was completed. The project has provided an enormous volume of data on the "granitic" rocks of the Coast Plutonic Complex (CPC) which, when fully analysed and published, will provide basic information for further research. New projects related to the CPC will concentrate on the structural and tectonic evolution of the Complex and the stratigraphic significance of metamorphic pendants.

In the Deserters Range along the Northern Rocky Mountain Trench Upper Proterozoic (Windermere) strata were shown to rest nonconformably upon gneissic granite dated at 728 Ma, an age consistent with other "basement" rocks involved in structures of the eastern Cordillera.

Two regionally important facies changes, one in Proterozoic and one in lower Paleozoic rocks have important implications for structural analysis and mineral exploration in the Ogilvie Mountains of Yukon. In the general area of the Faro deposit recognition of large, low angle thrust faults and a reordering of stratigraphic units provides essential guides to continued mineral exploration.

Much of the field work in Nelson map-area (E1/2) is now complete. Careful work has led to many revisions of the earlier map because of more detailed stratigraphic control. Previously unrecognized faults have been delineated thus the new data will permit a much better focus for mineral exploration and to the development of regional tectonic models.

An E-scan resistivity system developed under joint funding by EMR and Premier Geophysics was successfully field-tested at Mount Cayley where drilling of one of the anomalies confirmed a geothermal gradient of about 100° C/km indicating a potential geothermal reservoir. Stratigraphic and geochronological studies have established that the Clearwater lavas are less than 1 million years old thus supporting the concept of an eastward younging hotspot trace for the Anahim Volcanic belt and for potential geothermal energy sources. Similarly, modelling of chemical data from the Mount Edziza volcanic complex suggests a history of magmatic evolution consistent with long-lived hydrothermal systems which may have geothermal energy potential.

Post-Pleistocene fault scarps along major valleys in the southern Coast Mountains indicate localization of recent earthquakes that may have acted as triggers to slope failures thus highlighting the need for studies to provide further information.

Preliminary research on sediment cores from near the Juan de Fuca - Explorer Ridge system off Vancouver Island resulted in the identification of what appears to be a recent "tropical" microfauna perhaps indicative of special local conditions.

In the Strait of Georgia 1700 km of continuous seismic profiling and preliminary interpretation was completed. The study outlined several Pleistocene and Recent fault scarps.

A four week geophysical cruise between 180 and 360 km west of Queen Charlotte Sound was conducted in cooperation with EPB and CHS. Continuous magnetic, gravity and bathymetric data together with some reflection seismic data were collected. The

magnetic data exhibits a very regular sequence of NNW trending anomalies with little evidence of transforms or offsets.

Coastal mapping was completed around the southern end of Vancouver Island (from Tofino to Saltspring Island). Dives using PISCES IV were designed to examine slope stability conditions in Hecate Strait and to observe submarine slide features in Kitimat Arm as a follow-up to previous geophysical studies.

A mathematical proof of a sediment size distribution model for coastal environments has been tested successfully and will require some changes in conventional sedimentological theory.

Certain Mesozoic strata on Queen Charlotte Islands are shown to have been flushed of hydrocarbons thus suggesting that substantial deposits may occur in suitable overlying reservoir rocks in the offshore. In that respect, Tertiary volcanic rocks in the Queen Charlottes contain cavities locally filled with hydrocarbons from an older source. These same volcanics give some indications of the presence of volcanogenic sulphide mineralization.

Personnel Notes

The Cordilleran Division has 42 full-time employees, 29 at Vancouver and 13 at Pacific Geoscience Centre. At Vancouver there are 15 scientists and 14 staff in administration, sales office, library and technical support services. In addition, K.M. Dawson of Economic Geology Division and J.J. Clague of Terrain Sciences Division are stationed at Vancouver and R.G. Anderson is a Post-Doctorate Fellow with the Division. At Pacific Geoscience Centre the Pacific Marine Geology Subdivision staff consists of 7 scientists and 6 support and administrative staff. C.J. Yorath is the subdivision head.

Vancouver office

M.P. Force was appointed as Stores Clerk June 1, 1982.

C.M. Lagatolla died 21 February 1983.

Pacific Geoscience Centre

Wynn Studsrud was appointed as Accounts Clerk April 4, 1982.

1982-83

Attendance at Meetings, Conferences, Courses

R.B. Campbell

Geoscience Forum, December, 1982, Whitehorse, Yukon.

R.G. Currie

Geomagnetic Workshop, April 13-15, 1982, Golden, Colorado.

Circum-Pacific Energy, and Mineral Resources Conference, August 22-28, 1982, Honolulu, Hawaii.

American Geophysical Union, Annual Fall Meeting, December 10-15, 1982, San Francisco, California.

G.H. Eisbacher

Slope Hazards Field Trip, May, 1982, Quesnel, B.C.

'Till Mauritania', January, 1983, (Mauritania, Africa).

International Sedimentological Congress, September, 1982, Hamilton, Ontario.

H. Gabrielse

Geological Society of America, Council Meeting, May 26-28, 1982, Boulder, Colorado.

Penrose Conference on Sonoma Orogeny, September 8-13, 1982, Winnemucca, Nevada.

Geological Society of America, Annual Meeting, Oct. 17-21, 1982, New Orleans.

Geological Survey of Canada, Current Activities Forum, January 19-20, 1983, Ottawa, Ontario.

Canadian Committee on the Dynamics and Evolution of the Lithosphere, February 18, 1983, Ottawa, Ontario.

T.S. Hamilton

Workshop on polymetallic sulfides and field trip, May 1982, (joint GSC., NOAA, USGS).

J.L. Luternauer

IAS - 11th Int. Congress on Sedimentology - August 22-27, 1982.

2nd Canadian Conference on Marine Geotechnologic Engineering - June 7-10/82.

P. McLaren

Baffin Island Oil Spill Workshop, Edmonton, Alberta.

Ice Scour Workshop - National Research Council, Montebello, P.Q.

Workshop on coastal erosion and sedimentation, NRC, Simon Fraser University, Burnaby, B.C.

International Association of Sedimentologists, 11th International Congress, McMaster University, Hamilton, Ontario.

J.W.H. Monger

Penrose Conference on Sonoma Orogeny, October, 1982, Winnemucca, Nevada.

Geological Society of America, National Meeting, November, 1982, New Orleans.

Tectonic Symposium organized in honour of Professor Jean Aubouin, December, 1982, Paris, France.

Cordilleran Workshop, February, Vancouver, B.C.

M.J. Orchard

Ecos III - Third European Conodont Symposium, Lund, Sweden.

J.A. Roddick

Circum-Pacific Plutonism Project; Field examination of Donegal granites of Ireland, and tin granites of Cornwall, England, April 12-28, 1982.

L.C. Struik

Penrose Conference on Sonoma Orogeny, September 7-14, 1982, Winnemucca, Nevada.

Cordilleran Workshop, University of British Columbia, February 5-6, 1983, Vancouver.

R.I. Thompson

Geoscience Forum, December, 1982, Whitehorse, Yukon.

H.W. Tipper

North American Paleontology Conference, August, 1982, Montreal, Quebec.

J.O. Wheeler

Geodynamics Continental Margins Transects Symposium, April 4-8, 1982, Boulder, Colorado.

GSA Centennial Project Steering Committee Meetings, May 25, 1982, Boulder, Colo. and Oct. 19, 1982, New Orleans.

GSA Penrose Conference on Sonoma Orogeny, Sept. 7-13, 1982, Winnemucca, Nevada.

Canadian Geoscience Council Meeting, May, 1982, Winnipeg, Man. and September 16, 1982, Vancouver, B.C.

NSERC Strategic Grants Panel (Open Category) September 20-23, 1982, Ottawa, Ontario.

Winging It - course on public speaking without notes, March 23-24, 1982, Vancouver, B.C.

G.J. Woodsworth

North American Continental Margins Transects Program Conference, Denver, Colorado.

C.J. Yorath

First Symposium of International Geodynamics Transects Program, Speaker, April, 1982, Boulder, Colorado.

Second Symposium of International Geodynamics Transects Program, Speaker, November, 1982, New Orleans.

West Coast Offshore Oil and Gas: Expectations and Opportunities, Invited Speaker, November, 1982, Vancouver.

Membership on Committees

R.B. Campbell

British Columbia and Yukon Chamber of Mines, Advisory Board.

R.G. Currie

Member, Organizing Committee, Joint Annual Meeting at the Geological Association of Canada, Mineralogical Association of Canada and the Canadian Geophysical Union, Victoria '83.

G.H. Eisbacher

Associate Editor: GEOLOGY.

H. Gabrielse

Geological Society of America, Councillor.

Canadian Committee on the Dynamics and Evolution of the Lithosphere, Member.

Code Committee for Revision of the North American Stratigraphic Code, Member.

S.P. Gordey

Councillor, Geological Association of Canada, Cordilleran Section.

Member, Safety Committee, B.C. & Yukon Chamber of Mines.

J.L. Luternauer

Member, Order in Council 908 Environmental Assessment Committee (British Columbia Provincial Government).

Scientific Advisor, Roberts Bank Environmental Review Committee (Port of Vancouver Federal Government).

Scientific Advisor, Iona Island Sewage Treatment Plant Study Group (Greater Vancouver Sewage and Drainage District).

P. McLaren

Departmental Committee on Ocean Mining.

Society of Economic Paleontologists and Mineralogists.

J.W.H. Monger

Associate Editor, Canadian Journal of Earth Sciences.

Vice-Chairman, Working Group 2, "Phanerozoic plate motions and orogenesis", Inter-Union Commission on the Lithosphere.

J.A. Roddick

Editor, Circum-Pacific Plutonism Project; International Union of Geological Sciences - International Geological Correlations Program.

J.G. Souther

Member, Project Steering Committee, Program Review Committee, and Technical Co-ordination Group for the Meager Mountain Project.

Member, GSA Bulletin Board of Associate Editors.

R.I. Thompson

President, Geological Association of Canada, Cordilleran Section.

Member, Liaison Committee, Canadian Society of Petroleum Geologists.

Councillor, Structural Geology and Tectonics Division of the Geological Association of Canada.

Associate Editor, Bulletin Canadian Petroleum Geology.

H.W. Tipper

North American representative on the Jurassic Subcommission of the I.U.G.S.

J.O. Wheeler

Canadian Geoscience Council, Past President, 1982.

NSERC Strategic Grants Panel (open category) 1981-1984.

GSA - Centennial Project Steering Committee.

G.J. Woodsworth

Member, Canadian Permanent Committee on Geographic Names Advisory Committee on Glaciological and Alpine Nomenclature.

Member, Geological Association of Canada, Program Committee for 1983 Annual Meeting.

Member, Safety Committee, B.C. & Yukon Chamber of Mines.

C.J. Yorath

Councillor, Geological Association of Canada.

Technical Program Chairman, Annual Meeting of the Geological Association of Canada/Mineralogical Association of Canada/Canadian Geophysical Union, Victoria, May 11 to 13, 1983.

Member, Canadian Committee on the Dynamics and Evolution of the Lithosphere.

Member, Marine Geoscience Committee, Canadian Geoscience Council.

Member, National Liaison Committee, Canadian Society of Petroleum Geologists.

Special Talks or Lectures

R.B. Campbell

"Geology of the Saint Elias Mountains, Yukon, Alaska and British Columbia", Geoscience Forum, Whitehorse, Yukon, Dec. 1982.

R.G. Currie

Geophysical Surveys in the Northeast Pacific with R.P. Riddihough.

Circum-Pacific Energy and Mineral Resources Conference, Honolulu, Hawaii, August 22-28, 1982.

G.H. Eisbacher

'Acceptable and unacceptable risk from mass movements', Quesnel (May, 1980); Simon Fraser University (October, 1982).

'Clastic basins and Cordilleran tectonics': Intern. Sed. Congress, Hamilton Ont., (September, 1982), University of Berlin, (January, 1983), University of Karlsruhe (February, 1983).

'Sedimentary tectonics and Late Proterozoic glaciation': Intern. Sed. Congress, Hamilton (September, 1982), University of Kiel (February, 1983), Nouakchott-Mauritania (January, 1983).

H. Gabrielse

Transcurrent faulting in the northern Cordillera; Current Activities forum, Ottawa, February, 1983; U.B.C., March, 1983.

The main elements of Cordilleran geology, Simon Fraser University, March, 1983.

T.S. Hamilton

1982, GAC, Winnipeg with C.M. Scarfe, "Lava Viscosities and Nodule Transport at Level Mountain, Northern British Columbia", prog. with Abstract V. 7, p. 54.

J.L. Luternauer

"Slope erosion off a sewage outfall channel Fraser River, Delta, B.C.", presented at a meeting of the Iona Island Study Group concerned with suitable site for proposed sewage outfall pipeline.

"Stability of the Fraser River Delta front" (presented at 2nd Can. Conf. on Marine Geotech. Eng., Halifax, N.S. June 7-10, 1982 (w/L. Finn). Published in proceed volume.

"The relic surface of the central B.C. continental shelf" (presented at IAS conference 1982, Hamilton, Ontario, August 22-27).

"Roberts Bank tidal flats, Fraser River Delta, B.C.: Thalassinidean shrimp distribution (presented at IAS conference, 1982) (w/D. Swinbanks).

"Roberts Bank tidal flats Fraser River Delta, B.C.: Intertidal biofacies" (presented at IAS conference, 1982) (w/D. Swinbanks).

P. McLaren

"Interpretation and applications of trends in sediment distributions"; University of Calgary.

Also presented at University of Alberta.

The sedimentology and geomorphology of ice scour; National Research Council Workshop, Montebello, P.Q.

Marine and coastal research at PGC; National Research Council Workshop, Simon Fraser University.

Grain size statistics: a new look at their meaning; International Association of Sedimentologists, McMaster University.

J.W.H. Monger

At G.S.A.: U.S. Geodynamics Committee Symposium: North American continent ocean transects: "Continent: Ocean transition near 49 degrees N: Cordilleran fold and thrust belt to Juan de Fuca plate".

At Aubouin symposium: Les lambeaux lithospheriques accoles a la marge continentale americaine: "Terranes accreted to the western margin of North America".

At Kings College, London University: "Tectonic accretion and Mountain Building".

At U.B.C., Vancouver, and Western Washington University, Bellingham: "Evolution of the Canadian Cordillera".

M.J. Orchard

Lecture at ECOS III - Third European Conodont Symposium, Lund, Sweden.

J.G. Souther

Cenozoic volcanism in Western Canada, University of British Columbia.

C.B.C. documentary on Mt. Edziza volcano.

Geothermal Energy, Vancouver Optimus Club.

High temperature geothermal resource potential in Canada. G.E.R.M. Symposium, Ottawa.

L.C. Struik

Penrose Conference on Sonoma Orogeny; presentation on Permo-Triassic relationships in the Cariboo District of B.C., Canada.

R.I. Thompson

A progress report on regional geologic studies in the Ogilvie Mountains, Yukon, delivered at Geoscience Forum, December, 1982.

H.W. Tipper

"The allochthonous Jurassic-Lower Cretaceous terranes of the Canadian Cordillera and their relation to correlative strata of the North American Craton"; Third North American Paleontological Convention, in Symposium on Jurassic-Cretaceous Biochronology and Biogeography of North America, August, 1982.

"Jurassic molluscan biogeography of western North America and Implications to microcontinent accretion" (Abstract); Third North American Paleontological Convention, in Symposium on "Jurassic-Cretaceous Biochronology and Biogeography of North America", August, 1982. (Junior author with Taylor, D.G., Callomon, J., Hall, R., Smith, P., Tipper, H.W., and Westermann, G.E.G.

J.O. Wheeler

Eastern Third of Cordilleran Cross-section: Geodynamics Continental Margin Transects Symposium, Boulder, Colo., April 4, 1982.

Tectonic Map of Canadian Cordillera: Memorial University, St. Johns, Newfoundland, January 24, 1983.

Geology of Kootenay Arc, B.C.: University of British Columbia, Vancouver, B.C., March 16, 1983.

G.J. Woodsworth

Lecture on Coast Mountains at U.B.C.

C.J. Yorath

Petroleum possibilities off Canada's west coast; lead-off address given at West Coast Offshore Oil and Gas: Expectations and Opportunities, Conference, Vancouver, November, 1982.

The Queen Charlotte Islands continental margin; First symposium of International Geodynamics Transects Program, Boulder, Colo., April, 1982.

Corridor B1: Skeena Mountains to Queen Charlotte Islands; Second Symposium of International Geodynamics Transects Program, New Orleans, November, 1982.

ECONOMIC GEOLOGY DIVISION

D.C. Findlay, Director

The Division has four main responsibilities:

1. To maintain a national information base on the nature, distribution and geological characteristics of Canada's non-hydrocarbon mineral resources;
2. To conduct research into the mechanisms of formation of mineral deposits;
3. To interpret the relationships of mineral deposits to the geological characteristics of Canada's principal geographic and geological regions;
4. To provide, through the integration of the results of 1 to 3 above, guidelines and models for use by the Canadian exploration industry and input to government policies in resource management and land-use planning activities.

Divisional activities directed at carrying out its responsibilities include:

1. The continuing investigation through field and laboratory studies of mineral deposits in all regions of Canada, with particular focus on major metal commodities such as copper, nickel, lead-zinc, gold, silver, iron, molybdenum and uranium, coupled with special investigations of other commodities such as tin, tungsten, chromium, platinum-group metals and rare-earth metals as strategic and economic priorities dictate;
2. The development and maintenance of national information files, both manual and computerized, on Canadian mineral deposits and mineral deposit types;
3. The application of specialized research techniques such as isotope studies, computer simulations and mathematical and statistical correlation methods as aids to the interpretation of ore-forming mechanisms;
4. The integration of local and regional studies on the nature and distribution of mineral deposits with knowledge of the characteristics of their geological environments to yield interpretations of the mineral resource endowment of particular regions;
5. The development and application of methods, including mathematical methods, to evaluate the potential of various geological regions to contain undiscovered mineral resources.

In all of these activities, interaction and cooperation with scientists in industry, the universities, other federal and provincial agencies is an important continuing component.

The Division comprises five operational groups: Mineral Deposits Geology Section, Uranium Resource Evaluation Section, Geomathematics Section, Mineral Data Bank Unit, and a Divisional Headquarters and Special Projects Unit. Its staff of 48 continuing positions and 3 casual person-years includes 27 research scientists, 13 physical scientists, 1 mathematical statistician, and 7 in administrative and technical support.

The Mineral Deposits Geology Section conducts national commodity and regional metallogenic studies (activities 1, 3 in part, and 4, above) except in the case of uranium. The Uranium Resource Evaluation Section conducts investigations of uranium deposit types and is responsible for regularly-scheduled appraisals of Canadian uranium and thorium resources additional to reserves that are required in the MER-URAG (Uranium Resource Appraisal Group) activity (part of activities 1, 2, 4 and 5 above). The Geomathematics Section develops and applies methods for the quantification and statistical treatment of geoscience data in support of various projects throughout the Geological Survey. Within the Division its principal responsibility is the development and application of mathematical methods in resource evaluation (activity 5 and in part 3, above). The Mineral Data Bank is responsible for the construction, maintenance and assessing of the Division's computerized national mineral deposit index file (CANMINDEX) as well as other special purpose information files (parts of activity 2, above). It also provides the computer-generated information bases for use in regional resource evaluation studies (activity 5). The Special Projects Unit undertakes responsibilities in matters such as regional resource evaluations, federal-provincial mineral agreements, and interbranch activities on industrial minerals and deep-sea mineral resources.

Highlights
(Division Summary)

Highlights of the year's work for each of the Division Sections are presented under the relevant headings on the following pages. For the Division as a whole, a summary is as follows.

Mineral Deposits Geology

- A synopsis volume of some 40 different Canadian mineral deposit types was completed.
- A reconnaissance study of gold deposits of Superior Province suggests that most occur associated with deeply-penetrating crustal structures.
- Detailed studies of gold deposits in the Geraldton-Beardmore area, Ontario and in the Contwoyto Lake area, NWT (Lupin Mine) are providing insights into the genetic relationships between iron formation and gold concentrations.
- Preliminary results of studies of the Mt. Pleasant tungsten-molybdenum-tin deposit allow differentiation between stages of tin and tungsten-molybdenum mineralization.
- Preliminary results of investigations of Cyprus volcanogenic massive sulphide deposits suggests associations with sea-floor hot-vent processes.
- Studies of the Palliser Formation, Alberta and B.C., conducted with Esso Minerals Ltd., provided geochemical (26 elements) typing representative of a 900 km strike-length of the formation.
- A new model for interpretation of lead-isotope data for mineral deposits of the Canadian Shield was developed.
- With the Manitoba Department of Energy and Mines, detailed chemical and petrological investigations of chromite in the Bird River Sill (Manitoba) were begun.

Uranium Resource Evaluation

- Recognition of the relationships of pitchblende veins in the Union Island area (East Arm Great Slave Lake) with the sub Et-Then unconformity suggests

possible economic potential fo the Et-Then basin area for uranium.
- Laboratory investigations of chemical changes taking place in seawater during evaporation were begun to elucidate processes of concentration of lead, zinc, copper, uranium and other metals associated with evaporites.
- Carbon isotope studies of sedimentary rocks of the Magdaleen Islands suggest that carbon in the strata was, in part, derived from petroleum, a suggestion that could have implications for oil and gas potential in the St. Lawrence Platform region.
- An update of Canada's resources of uranium additional to reserves was completed for the Departmental URAG process.

Geomathematics
- A major IGCP (International Geological Correlation Programme) meeting on "Image Analysis for the Study of Morphology" was hosted in Ottawa.
- Further development and refinement of two widely-accepted statistical package systems for applications in geology (GIAPP[1], SIMSAG[2]) were made.
- With AGC (Atlantic Geoscience Centre) a computer system (RASC[3]) for quantitative biostratigraphic correlation was developed.
- A LANDSAT image analysis study (using GIAPP) was begun in the Baker Lake area, NWT.

Other
- Two major regional resource assessment studies (Yukon Territory, Bathurst Inlet) were completed.
- Phase II (field follow-up) investigations (geochemistry, geology) were conducted in the Mount Sedgwick area, Yukon, in connection with the Northern Yukon National Park resource assessment study.
- Two new regional assessments (East Arm-Artillery Lake; Borden Peninsula-Bylot Island) were begun.
- Cooperative mineral programs between Canada (EMR) and Nova Scotia and Canada and Newfoundland completed their first year of operation (Special Projects).
- Planning for new research programs on sea-floor hydrothermal sulphide regimes was initiated.
- Two geological delegations from the People's Republic of China and one from USSR (Ministry of Geology) were hosted.

Personnel Notes

Dr. G.B. (Geoff) Leech retired as Director, Economic Geology Division on July 1, 1983, after 12 years of skillfully leading Economic Geology from a small subdivision through to its present status as a full Division. Dr. D.C. (Chris) Findlay was appointed Division Director in July, 1983.

Dr. F.D. (Frank) Anderson continues to provide valuable serve on a part-time (post-retirement) basis as Assistant Director.

[1] Geological Image Analysis Programme Package

[2] System of interactive graphic programs for multivariate statistical analyses of geoscience data.

[3] RAnking and SCaling.

MINERAL DEPOSITS GEOLOGY SECTION

R.I. Thorpe

The major objectives of the Mineral Deposits Geology Section are to: (a) develop and maintain mineral deposits expertise on a national basis so that questions regarding resource potential or adequacy, whether posed on a national commodity or on a regional basis, can be answered, and (b) contribute to the success of exploration efforts by the mineral industry.

To achieve these objectives, staff of the Section (1) acquire and synthesize data on Canadian mineral deposits types, other than uranium, so that their common characteristics and critical differences are more fully appreciated,
(2) develop and improve genetic models, particularly for major deposit types, and test these models by further observation and research,
(3) study deposits of numerous types on a regional basis in order to better understand their formation in terms of the overall geological evolution of the region,
(4) improve the techniques and criteria used in making appraisals of mineral potential,
(5) assess regions as to their mineral potential.

The first two of these activities are generally pursued through commodity geology projects on a national basis. Major metal commodities receive ongoing study whereas other commodities, selected on the basis of economic and strategic priorities and availability of staff, are studied on a term basis.

The third activity is pursued, currently, in a small number of regional metallogeny projects. These integrate the data and conceptual models developed through commodity metallogenic studies with regional geological information available from published and unpublished sources and generated in the projects by directed field studies.

These Section studies are based on extensive fieldwork supplemented by laboratory studies and by monitoring the national and international literature on mineral deposit geology. Visits to foreign deposits contribute importantly to the ability to appraise mineral potential and to suggest geological settings or target areas in Canada that might warrant exploration.

The resource Appraisals are conducted on an ad hoc basis in response to intermittent demands, which necessarily results in some disruption of the commodity-regional metallogeny program.

Mineral Deposits Laboratory

C.R. McLeod

The Mineral Deposits Laboratory prepares specimens for study, provides facilities for microscopy, photomicrography, particularly with regard to opaque minerals, and for special mineral separations in preparation for analyses. Its services are available to all Divisions.

Specimens are slabbed (sawn) for three main purposes: to provide a flat, fresh surface for examination, to divide the sample for various further uses, e.g. chemical analysis, and as a step toward further preparation, e.g. by polishing.

Preparation of polished sections involves cutting, mounting, grinding, impregnation and regrinding and three stages of machine polishing of the ground surfaces. Sections are polished for conventional ore microscopy and for electron microprobe studies.

Production statistics for the year are:

Specimens slabbed for:	
Economic Geology	3850
Resource Geophysics and Geochemistry	355
Central Laboratory & Technical Services	448
Precambrian Geology	3
Total	4656
Specimens slabbed and polished for:	
Economic Geology	775
Resource Geophysics and Geochemistry	194
Central Laboratory & Technical Services	6
Precambrian Geology	16
CANMET	1
Total	992
Polished sections prepared for:	
Economic Geology	359
Resource Geophysics and Geochemistry	92
Central Laboratory & Technical Services	125
Precambrian Geology	28
Terrain Sciences	5
Total	609
Mineral separations for:	
Economic Geology	383
Resource Geophysics and Geochemistry	17
Precambrian Geology	2
Total	402

Highlights

A reconnaissance study of gold deposits in the Superior Province established that most occur in zones of long-lived, deeply penetrating crustal structures. Detailed examination of deposits in the Geraldton, Ontario area indicated that iron formation was a very effective chemical trap but was not the source of gold. Isotopic studies suggest that the fluids responsible for gold mineralization originated deep in the crust, probably during dehydration reactions associated with the greenschist-amphibolite transition. The distribution of gold mineralization in metamorphosed iron formation at Contwoyto Lake in the Slave Province was found to be more complex than previously realized in that syngenetic, remobilized syngenetic and epigenetic components are present.

A geochemical study of the Palliser Formation in Alberta and British Columbia, undertaken jointly with Esso Minerals Ltd., was completed. Analyses of 26 elements in each of 1284 samples from 40 stratigraphic sections representing a 900 km strike length of the formation will be made public in an open file release. The data will be of use in understanding the role of source rock chemistry in the genesis of sediment-hosted base metal deposits, and also the sedimentological controls on the metal concentrations in carbonate rocks.

A new empirical model for the interpretation of lead isotope data for mineral deposits in the Canadian Shield was presented. This will permit the calculation of more meaningful model ages. Investigation of lead isotopic compositions of Precambrian gold deposits indicate that many differ significantly from those in volcanogenic massive sulphide deposits. The galenas from gold deposits in many cases have slightly younger model ages than their host rocks. Some also have high values of mu which indicates that the gold-bearing mineralizing fluids were generated in moderately old felsic crust.

A comprehensive investigation of the mineralogical characteristics of chromite in the Bird River Sill, Manitoba was designed and initiated in cooperation with the Manitoba Department of Energy and Mines, and was carried out under contract by scientists at Carleton University. The composition of chromite was found to vary within narrow limits (e.g., 37.5 - 43 wt. % Cr_2O_3) and minor quantities of osmium-ruthenium-iridium sulphide were observed to be commonly associated with the chromite.

A detailed study of the Mount Pleasant tungsten-molybdenum-tin deposit in New Brunswick was initiated in cooperation with the operating company. Early results indicate that most of the tin mineralization is related to a late-stage, highly differentiated granitic intrusion that post-dates tungsten-molybdenum mineralization. Field examination of the recently discovered tungsten-tin deposit near Big Kalzas Lake in the Yukon Territory indicated that it comprises widespread, low-grade tungsten and minor tin mineralization in quartz veinlet stockworks, and thus may be a deposit of the porphyry type.

A synopsis comprising one page summaries of the geological and economic characteristics of each of 40 Canadian mineral deposit types was completed. The symopsis will be of use to geoscientists engaged in teaching, research, exploration and resource evaluation.

A study of the mobility of heavy metals and sulphur during hydrothermal alteration of basaltic rocks was initiated as part of the Cyprus Project of the International Crustal Research Group. In providing senior on-site economic geology expertise, important contributions were made to the successful execution of the drilling phase of this project. Moreover, efforts were made to provide training for geologists from the less developed countries, one of the stated goals of the program.

Several initiatives were taken in the planning of a research program on submarine hydrothermal sulphide deposits off Canada's west coast including participation in a U.S. Geological Survey cruise to gain first hand knowledge of certain sampling techniques, a joint field trip with scientists from the U.S. to examine massive sulphide deposits in the Canadian Shield, and participation in discussions among Canadian, French and U.S. scientists with regard to the origin of ocean floor mineral deposits and the methods of studying them.

Advice and contributions of data were provided to the International Strategic Minerals Inventory, a joint project of the governments of Canada, the United States, the Federal Republic of Germany, the Republic of South Africa and Australia.

URANIUM RESOURCE EVALUATION SECTION

V. Ruzicka

The Uranium Resource Evaluation Section gathers, generates and interprets information on the geology of uranium-bearing areas and deposits. It is responsible for a biennial appraisal of Canadian uranium and thorium resources additional to reserves (Estimated Additional Resources) and for advising CANMET on geological questions related to its companion appraisal of Reasonably Assured Resources. The appraisal encompasses a range from inferred extensions of reserves in identified deposits to prognosticated and speculative resources of less-explored uranium-bearing areas and to areas assumed on geological grounds to be favourable for uranium mineralization. Emphasis is on uranium; thorium resources are evaluated only where they are associated with uranium. The evaluations are based on extensive field and laboratory studies and on materials and documentations provided by the industry, provinces and universities. The evaluation, conducted in cooperation with CANMET, provinces and Department of Indian Affairs and Northern Development, is an input to the management of Canada's uranium and nuclear energy policy.

Highlights

An interim report for URAG on Estimated Additional (Inferred) Uranium Resources in Canada was completed in January and approved by URAG. This report reflected changing economic situations in the world market and the results were submitted by EMR to IAEA/NEA.

A uranium metallogenic study on the central part of District of Keewatin demonstrated similarities with the Athabasca Basin area and presented genetic interpretations of the Lone Gull uranium deposit at Schultz Lake. These studies included interpretation of geological paleoenvironment through analyses of the sub-Thelon regolith.

Carbon isotope analyses of 12 samples of carbonate cements from sedimentary rocks from the Magdalen Islands confirmed that the carbon is derived from petroleum. This could have important implications for oil and gas resource potential in the St. Lawrence Platform region.

Preliminary results of laboratory simulation of evaporitic processes indicate some characteristic changes in chemical composition of sea water during evaporation; these features are important components in establishing conceptual models of uranium, lead, zinc and copper deposits associated with evaporites.

Conceptual models of Canadian uranium deposits applied to metallogenic studies constitute an important component in the assessment of undiscovered uranium resources in Canada. The recent discovery of the Waterbury Lake deposit in Saskatchewan was based on a modelling concept similar to that developed by GSC.

Field studies in the northern Cordillera led to the discovery of small breccia bodies which are part of larger (8-10 km size) breccia fields in Wernecke Mountains. The distribution of U and U-Cu deposits in the breccia fields shows a zoning pattern which in turn led to the discovery of a new Cu-Au occurrence.

Recognition of the supergene origin of pitchblende veins in Union Island, East Arm, Great Slave Lake area and their close relation to the sub-Et-Then unconformity suggests some economic potential for the Et-Then barriers; this may serve to focus exploration attention for uranium in this area.

GEOMATHEMATICS SECTION

F.P. Agterberg

The objectives of the Geomathematics Section are (i) to develop and apply probabilistic methods of mineral resource estimation for land-use planning purposes; (ii) to provide statistical expertise and services to projects throughout the Geological Survey; and (iii) to develop statistical exploration methods for use by the mineral industry.

These objectives are met by maintaining a long-range research programme on mathematics and statistics applied to solve geological problems. Geostatistical techniques and systems of computer programmes are prepared for use in projects normally carried out in collaboration with other Geological Survey staff. Documented computer programmes may be transferred to other Sections or to outside organizations.

Specific topics on which consultation is provided included: (1) fitting of frequency distribution models; (2) trend-surface analysis; (3) multivariate statistics applied to geological data; (4) image analysis of photomicrographs and map patterns; (5) geostatistical contouring techniques including "Kriging"; (6) statistical analysis of directional features; (7) quantitative stratigraphic correlation techniques; (8) cluster analysis; (9) computer simulation of geological processes; and (10) geostatistical crustal abundance models.

Highlights

A 3-day meeting with 25 presentations of research on "Image analysis for the study of morphology" was organized in Ottawa, October 1982. This 4th meeting of the Canadian Working Group for IGCP, Project 148 was attended by 19 scientists from other countries. The participants consisted of geologists, oceanographers, mathematical statisticians, stereologists, biometricians and computer experts. The papers dealt with statistical analysis of lines, curves and surfacies in two- or three-dimensional space, the modelling of sizes and shapes of various objects (especially microfossils), as well as methods to study spatial interrelationships between forms.

At this meeting five papers on recent work were presented by members of the Geomathematics Section. F.P. Agterberg discussed objectives, results and unsolved problems in Project 148 (Quantitative Stratigraphic Correlation Techniques) of the International Geological Correlation Programme. The topic of structuring elements in morphology was addressed by A.G. Fabbri who gave a description of GIAPP (Geological Image Analysis Programme Package). Both he and G.F. Bonham-Carter showed applications of Minkowski operations applied to photomicrographs and maps. The

geometrical covariance was used to calculate frequencies of rose diagrams in order to study the interrelationships between preferred orientations in various patterns. G.F. Bonham-Carter has employed GIAPP for image analysis of map patterns for rock types, faults, geochemical information and LANDSAT data in the Baker Lake Area, Northwest Territories. The purpose of this study was to delineate areas which are relatively favourable for uranium occurrences. C.F. Chung discussed methods of geometric probability for the study of quartz chain links in relation to permeability of granite. The relative frequency of contacts between quartz crystals may be a significant factor determining radionuclide transport in crystalline radii. F.P. Agterberg described applications of new techniques for the fitting of vector fields to directional features (e.g. paleocurrent data in sedimentary rocks and b- lineations in tectonites) in two- or three-dimensional space.

During the year, the final version of the RASC computer programme for ranking and scaling of stratigraphic events was completed and documented for use at the Atlantic Geoscience Centre on well data from the Hibernia Oilfield and the Labrador Shelf. In collaboration with F.M. Gradstein (A.G.C.), a new technique of quantitative stratigraphic correlation was developed in which micropaleontological data are being integrated with lithologic information.

Mineral Data Bank Unit

D.F. Garson

The Mineral Data Bank retains overall responsibility for all commodity and metallogenic files of the Economic Geology Division. Curation and maintenance of rock and mineral collections used in research by officers of the Division is also a function of the Data Bank.

The main assembly of document files and related scientific collections is by project officers and remains in their control for the duration of relevant projects. Present activities of the unit are the assembly, maintenance, retrieval, and manipulation of an extensive computer processable mineral deposit data file called CANMINDEX, the provision of computer programming assistance to Division personnel for CANMINDEX-related file activities, and the curation of specimens collection for completed projects.

Highlights

Much of the work of the Mineral Data Bank is in support fo other projects and contributed to some of the highlights mentioned elsewhere. In particular, Mineral Data Bank staff have provided extensive data processing services and advice for the GSC-Esso project, the Pb-isotope file and the Pb-Zn file. Commodity collections for titanium, barium, strontium and fluorine were curated.

One month's training in the ways and means of mineral resources data management was provided to a representative of the Brazilian Department of Mineral Production.

In CANMINDEX, coding, editing and data entry for all commodities for Northwest Territories have been completed and coding of deposits and mines has been initiated. Approximately 750 new records were added to the CANMINDEX file during the year, bring the total to 18,250.

Personnel Notes

D.D. Picklyk was on secondment to the office of the ADM, Earth Sciences, throughout the year.

Special Projects Unit

Co-operative Mineral Programs

W.H. Poole

The cooperative mineral programs between Canada (EMR) and Nova Scotia (Department of Mines and Energy) and between Canada (EMR) and Newfoundland (Department of Mines and Energy) completed their first effective year of operations. These two programs are the first of a new type which are successors to the federal-provincial mineral development subsidiary agreements funded by DREE (and EMR in some agreements).

Within the program in Nova Scotia, GSC spent nearly $900 000 on projects including a geological study of the origin of the gold deposits, surficial geology and geochemistry of glacial till, geochemical distribution of metals in stream sediments, aeromagnetic gradiometer survey to support the gold deposit study and airborne radiometric survey to characterize granites and especially to detect uraniferous granites.

In insular Newfoundland and Labrador, GSC spent about $1.4 million carrying out projects which included geological and geophysical studies at Buchans mine, geological mapping in Labrador and insular Newfoundland, surficial geology and till geochemistry within the Central Mineral Belt in Labrador, and a geochemical lake sediment survey over a large area of southwestern Labrador.

The Geological Survey and the two provincial departments are pleased with what has been accomplished in geoscientific projects and with the trust and goodwill which characterized our working relations. Most leaders of projects supported by GSC under the programs are provincial staff members. Uncertainties and difficulties understandably encountered with management and administration of these new arrangements were overcome to the satisfaction of all parties.

Personnel Notes

Dr. W.H. Poole, although administratively a member of Economic Geology Division, assumed responsibilities in 1983 of acting as coordinator for Geological Survey involvement in the new cooperative mineral programs in Nova Scotia and Newfoundland (see above).

Dr. G.A. Gross was awarded the 1981 District 3 Proficiency Medal of the Canadian Institute of Mining and Metallurgy in recognition of significant contributions to the geology, metallurgy and evaluation of iron-formation in Canada, to the enhancement of Canada's image abroad in the geological sciences and to the continuing interest shown in the activities of the CIM.

Wan Liang-guo, a research associate from the Geological Survey of Inner Mongolia returned to China in late December 1982 after spending nearly two years on the iron and manganese project with G.A. Gross and C.R. McLeod in the study of iron formations, related metalliferous sediments and the genesis of iron ore deposits.

Attendance at Meetings, Conferences and Courses

F.P. Agterberg

Statistical Association of Canada Annual Meeting, Ottawa, June 1982.

4th Annual Meeting, Canadian Working Group of International Geological Correlation Programme Project 148, Ottawa, October 1982.

5th International Meeting, International Geological Correlation Programme Project 148, Geneva, November 1982.

Geological Survey of Canada Current Activities Forum, Ottawa, January 1983.

G.F. Bonham-Carter

International Sedimentology Congress, Hamilton, Ontario (McMaster University), August 1982.

M.M. Braham

"The Secretary as Manager", Institute for Management Training, Toronto, November 1982.

"Understanding and Management of Stress", seminar conducted by F.F. Lawson, Ottawa, February 1983.

"Organizational Behaviour", Algonquin College, Fall semester, 1982.

Data Processing II, Algonquin College, Ottawa, Spring semester, 1982.

Cobol I, Algonquin College, Ottawa, Fall semester, 1982.

L.M. Cumming

Science Fair & Awards Ceremony, National Museum of Science and Technology, Ottawa, April 1982.

Centennial Meeting of the Canadian Institute of Surveying, Chateau Laurier, Ottawa, April 1982.

84th Annual General Meeting, Canadian Institute of Mining and Metallurgy, Quebec City, April 1982.

Annual Meeting, Youth Science Foundation, Capital Place, Ottawa, October 1982.

A.G. Douma

Basic for Minis and Micros I, 31 May - 2 June, 1982, Ottawa, Energy, Mines and Resources.

Basic for Minis and Micros II, 3-4 June 1982, Ottawa, Energy, Mines and Resources.

Geological Survey of Canada Current Activities Forum, January 1983.

J.M. Duke

Geological Association of Canada/Mineralogical Association of Canada Joint Annual Meeting, Winnipeg, Manitoba, May 1982.

Management Development for Research Managers Course, Touraine, P.Q., November 1982.

Staffing for Line Managers Course, Ottawa, November 1982.

H.E. Dunsmore

S.E.P.M. Core Workshop on Depositional and Diagenetic Spectra of Evaporites, Calgary, June 1982.

A.A.P.G. Annual Convention, Calgary, June 1982.

Eleventh International Congress on Sedimentology, Hamilton, August 1982.

A.G. Fabbri

Seminar on Image Processing in Geology at the Electrical Engineering Division of NRC, Ottawa, May 1982.

VI International Association on the Genesis of Ore Deposits Symposium, Tbilisi, USSR, September 1982.

4th Annual Meeting of the International Geological Correlation Programme, Ottawa, October 1982.

D.C. Findlay

International Strategic Minerals Inventory Meetings, Reston, VA (April 1982) and Hannover, Federal Republic of Germany (October 1982).

Canadian Institute of Mining and Metallurgy Annual General Meeting, Quebec City, April 1982.

Geological Association of Canada/Mineralogical Association of Canada Joint Annual Meeting, Winnipeg, May 1982.

Workshop on Science and Technology in Mineral Policy, Queen's Centre for Resource Studies and Carnegie Institute of Washington, Kingston, Ontario June 1982.

Third International Symposium on Mineral Resources of the Earth, "New Paths to Mineral Exploration", Hannover, Federal Republic of Germany, October 1982.

Ontario Geoscience Forum, Toronto, December 1982.

Geological Surveyof Canada Current Activities Forum, Ottawa, January 1983.

D.F. Garson

Industrial Minerals Seminar, Ottawa, May 1982.

Federal-Provincial Industrial Minerals Seminar, Ottawa, October 1982.

Geological Survey of Canada Current Activities Forum, Ottawa, January 1983.

Energy, Mines and Resources Classification Course for Managers, Ottawa, February 1983.

T.F.S.S. Field Equipment Seminar, Hull, March 1983.

R.A. Gaudreau

Energy, Mines and Resources Classification Course for Managers, Ottawa, February 1983.

S.B. Green

Geological Survey of Canada Current Activities Forum, Ottawa, January 1983.

G.A. Gross

NATO Advanced Research Institute on Hydrothermal Processes at Seafloor Spreading Centres, Cambridge University, Cambridge, UK, April 1982.

13th Annual Underwater Mining Institute in Madison, WI, October 1982.

The Carnegie Institute of Washington Workshop on Marine Polymetallic Sulphide Deposits and the Mineral Policy-making Process, January 1983.

The Marine Polymetallic Sulfides Workshop and program review of NOAA (National Oceanic and Atmospheric Administration, Dept. of Commerce, United States), January 1983 (member of panel on Ocean Mineral Resources and Technology).

M.N. Henderson

Special meeting of the Tectonics Study Group on the Northern Margin of the Hercynian Orogen in Dublin, September 1982.

J.A. Kerswill

Ontario Geological Survey Pentrillium Discussion Conference, "The Geology of Gold Deposits with Archean Emphasis", Toronto, March 1983.

R.M. Laramee

Image Analysis for Study of Morphology, Geological Survey of Canada, Ottawa, October 1982.

Evaluation of EDP Systems, Public Service Commission Ottawa, October 1982.

Comptabilite I, May-June, 1982; Methode d'analyse prealable et fonctionnelle, Sept-Dec., 1982; Analyse organique, Jan-Apr, 1983 – Universite du Quebec a Hull. These courses are part of a one-year program leading to a diploma.

C.R. McLeod

Energy, Mines and Resources Departmental Coordinating Committee on Ocean Mining, Halifax, July 1982 (included meeting with ocean-related industry representatives), Ottawa, January 1983.

Geological Survey of Canada Current Activities Forum, Ottawa, January 1983.

A.R. Miller

Yellowknife Geoscience Forum, Yellowknife, N.W.T., December 1982.

K. Nguyen

Mineral Deposits; Mineral Exploration, Valuation and Development - University of Ottawa, Fall semester, 1982.

W.H. Poole

International Geological Correlation Programme, Caledonide Orogen, International meeting, Fredericton, New Brunswick, August 1982.

Newfoundland Department of Mines and Energy Annual Review of Activities, St. John's, November 1982.

New Brunswick Department of Natural Resources Annual Review of Activities, Fredericton, November 1982.

Nova Scotia Department of Mines and Energy Annual Review of Activities, Halifax, December 1982.

Geological Survey of Canada Current Activities Forum, Ottawa, January 1983.

Geological Society of America, Northeastern Section, Annual Meeting, Monticello, NY, March 1983.

S.M. Roscoe

Yellowknife Geoscience Forum, Yellowknife, N.W.T., December 1982.

V. Ruzicka

International Geochemical Exploration Symposium, Saskatoon, May 1982.

Geological Association of Canada/Mineralogical Association of Canada Annual Meeting, Winnipeg, May 1982.

Uranium Exploration Methods, OECD/IAEA Symposium, Paris, June 1982.

EC/Canada Uranium Committee Annual Meeting, Ottawa, October 1982.

D.F. Sangster

Geological Association of Canada/Mineralogical Association of Canada Joint Annual Meeting, Winnipeg, May 1982.

International Conference on Mississippi Valley-type lead-zinc deposits, Rolla, MO, October 1982.

W.D. Sinclair

Mineralogical Association of Canada Short Course, "Granitic pegmatites in science and industry", University of Manitoba, Winnipeg, May 1982.

Geological Association of Canada/Mineralogical Association of Canada Joint Annual Meeting, Winnipeg, May 1982.

Whitehorse Geoscience Forum, Whitehorse, Y.T., December 1982.

R.I. Thorpe

International Symposium on Archean and Early Proterozoic Geologic Evolution and Metallogenesis, Salvador, Brazil, September 1982.

Workshop on Massive Sulfides in Submarine Volcanic Rocks, Society of Economic Geologists, New Orleans, U.S.A., October 1982.

Geological Society of America, 95th Annual Meeting, New Orleans, U.S.A., October 1982.

Management Development for Research Managers (course) Touraine, Quebec, November, 1982.

Geological Survey of Canada Current Activities Forum, Ottawa, January 1983.

Ontario Geological Survey Pentrillium Discussion Conference: The Geology of Gold Deposits, with Archean Emphasis, Toronto, March 1983.

B. Williamson

Energy, Mines and Resources Shotgun & Rifle Training, May 1982.

University of Ottawa - Advanced Igneous Petrogenesis, Fall semester, 1982.

Prospectors and Developers Association Annual Convention, Toronto, March 1983.

Energy, Mines & Resources Pistol Training, March 1983.

T.F.S.S. Field Equipment Seminar, March 1983.

Special talks or lectures

F.P. Agterberg

"Probabilistic Stratigraphy and Computer Programs", lectures and demonstration, AAPG/CSPG Short Course on New Concepts and Methods in Stratigraphy, Calgary, June 1982.

"Vector Fields and Preferred Orientation of Map Features", and "IGCP Project 148: Objectives, Results and Unsolved Problems", Image Analysis Workshop, Ottawa, October 1982.

"Probabilistic Methods of Mineral Resource Appraisal", Institute of Geological Sciences, Keyworth, England, November 1982.

"Spatial Analysis in Mineral Resource Appraisal", Roayl Netherlands Geological and Mining Society, Delft, Netherlands, November 1982.

"Statistical Integration of Geoscience Data", International Institute for Aerial Survey and Earth Sciences, Enschede, Netherlands, November 1982.

"Binomial and Trinomial Models in Quantitative Biostratigraphy", IGCP Project 148 Meeting, Geneva, Switzerland, November 1982.

"Quantitative Stratigraphic Correlation and Geohistory Analysis", Free University of Amsterdam, Netherlands, December 1982.

"System of Interactive Computer Programs for Quantitative Stratigraphic Correlation", G.S.C. Current Activities Forum, January 1983.

"Statistics in Geology", course GE03100, Department of Geology, University of Ottawa, January-April 1983.

G.F. Bonham-Carter

"Prediction of uranium occurrences, Baker Lake, N.W.T., using image analysis" at workshop on Image Analysis for the Study of Morphology (IGCP Project 148) Ottawa, October 1982.

"Extracting geological information from digital LANDSAT images", presentation at GSC Geoscience Forum, Technical Sessions, January 1983 (half of this presentation was by R. Belanger, Terrain Sciences).

L.M. Cumming

"Chairman's Report on C.I.M. Activities", Annual Dinner, Ottawa Branch C.I.M., Ottawa, April 1982.

"Careers in Earth Science", Confederation Secondary School, Nepean, May 1982.

"Petroglyph Conservation, Nova Scotia", Parks Canada, Ottawa, May 1982.

"Geology of Platform Carbonates in Western Newfoundland and Zinc Mineralization", Mississippi Valley Deposits Group, Ottawa, August 1982.

"Careers in Geology", J.S. Woodsworth Secondary School, Nepean, November 1982.

J.M. Duke

"Origin of Disseminated Magmatic Sulphide Deposits of the Dumont Type"
- Geological Association of Canada/Mineralogical Association of Canada Joint Annual Meeting, Winnipeg, May 1982.
- Outokumpu Co., Helsinki, Finland, July 1982.
- University of Connecticut, September 1982.

"Mathematical Models of Magmatic Sulphide Ore Formation"
- Outokumpu Co., Helsinki, Finland, July 1982.
- University of Connecticut, Storrs, Connecticut, September 1982.

"The Finish Chromite Province: a Description and implications for Chromite Exploration in Canada", G.S.C. Current Activities Forum, Ottawa, January 1983.

A.G. Fabbri

Presentation to the Interuniversitarian Computing Center (CINECA), Casalecchio, Bologna, April 1982 and to Interuniversitarian Computer Center (CILEA),

Segrate, Milan, April 1982.

Seminar at the Electrical Engineering Division of NRC, Ottawa on Image Processing in Geology, May 1982.

Presentation of "Adjacency relationships in aggregates of crystal profiles", NATO Advanced Studies Institute on "Pictorial Data Analysis", Bonas, Frances, August 1982.

Presentation of contribution "Application of image processing for the detection of areas favourable to the occurrences of mineral resources" at VI IAGOD Symposium, Tbilisi, USSR, September 1982.

Presentation of contribution "Structuring elements in morphology" at 4th Annual Meeting of the International Geological Correlation Program, G.S.C., Ottawa, October 1982.

Seminar on "Image processing of geological data" presented at the Virginia Polytechnic Institute, Blacksburg, VA, November 1982.

D.C. Findlay

"Recent G.S.C. Resource Assessment Studies and their Role as Exploration Guides" (with D.F. Sangster), CIMM Annual General Meeting, Quebec City, April 1982.

"Regional Mineral Resource Assessment", Workshop on Science and Technology in Mineral Exploration, Queen's Centre for Resource Studies, Kingston, June 1982.

"Role of a Geological Survey in Mineral Exploration" (with W.W. Hutchison and J.M. Franklin), Federal Institute for Geosciences and Natural Resources (BGR), Third International Symposium on Mineral Resources of the Earth, Hannover, FRG, October 1982.

G.A. Gross

Conducted special field seminar for National Oceanic and Atmospheric Administration (NOAA) and United States Geological Survey scientists, on the Noranda and Timmins areas of Quebec and Ontario for comparative study of recent and ancient metalliferous sediments and sulphide deposits, May 1982.

J.A. Kerswill

"Some thoughts regarding Lupin gold deposit, Contowyto Lake area, N.W.T.", at Pentrillium Conference, Ontario Geological Survey, Toronto, March 1983.

C.R. McLeod

Poster session on "Mineral Resources on the Seafloor", Geological Survey of Canada Current Activities Forum, Ottawa, January 1983 (with G.A. Gross).

A.R. Miller

"Uranium Phosphorous association in the Thelon Formation and sub-Thelon saprolet, central District of Keewatin at Yellowknife, Geoscience Forum, December 1982.

W.H. Poole

"A stratigraphic sketch of Caledonide orogen and southeastern borderland", IGCP, Caledonide orogen, international meeting, Fredericton, N.B., August 1982.

S.M. Roscoe

"Booth River Intrusive Complex", presented at Geoscience Forum, Yellowknife.

"Booth River Intrusive Complex" talk at Precambrian High series, held by Precambrian Geology Division, February 1983.

V. Ruzicka

"Geological Aspects of the Evaluation of Uranium Potential", Uranium Resource Appraisal Group Seminar, Ottawa, April 1982.

"Studies on Uranium Metallogenic Provinces in Canada", OECD/IAEA Symposium 'Uranium Exploration Methods', Paris, June 1982.

"Developments in Uranium Exploration in Canada", Economic European Communities/Canada Uranium Committee Annual Meeting, Ottawa, October 1982.

D.F. Sangster

"Precambrian exhalative base metal deposits: Geology and genesis", Precambrian Seminar Series, Rice University, February 1982.

"Resource assessment studies - The Canadian experience", Geological Association of Canada Annual Meeting, Winnipeg, May 1982.

"Mississippi Valley-type deposits: A geological melange", International Conference on Mississippi-Valley-type lead-zinc deposits, Rolla, MO, October 1982.

W.D. Sinclair

Poster session "Methods used in assessment of mineral resource potential of Yukon Territory" presented at Geological Association of Canada/Mineralogical Association of Canada Annual Meeting, Winnipeg, May 1982.

"Methods used in assessment of mineral resource potential of Yukon Territory" presented at Whitehorse Geoscience Forum, December 1982.

R.I. Thorpe

"Lead isotope evidence regarding Archean and Proterozoic Metallogeny in Canada"; International Symposium on Archean and Early Proterozoic Geologic Evolution and Metallogenesis, Salvador, Brazil, September 1982.

"Mineral Deposits of the Canadian Shield"; Minas Gerais branch of the Geological Society of Brazil, special meeting, Belo Horizonte, Brazil, September 1982.

"A Lead isotope model and lead isotope data for Canadian Shield deposits", Memorial University of Newfoundland, St. Johns, Newfoundland, January 1983.

"Lead isotope evidence regarding the ages of Superior Province gold deposits", Ontario Geological Survey Pentrillium Discussion Conference, Toronto, March 1983.

Membership on Committees

F.P. Agterberg

Commission on Tectonics of Ore Deposits Working Group No. 3, Chairman.

Computers and Geosciences, Editorial Advisory Board.

Geo-Processing, Editorial Board.

Global Tectonics and Metallogeny, Associate Editor.

International Geological Correlation Program Project 148, Quantitative Stratigraphic Correlation Techniques, Leader, International Working Group and Co-leader, Canadian Working Group.

University of Ottawa, Adjunct Professor and Graduate School member.

Fifth International IGCP-148 Meeting, University of Geneva, Switzerland, General Chairman.

M.M. Braham

Department of Energy, Mines and Resources, Office of Equal Opportunity, Branch Representative for Geological Survey of Canada.

J.J. Carriere

United Way, 1982 Unit Campaign Co-ordinator for Geological Survey of Canada.

L.M. Cumming

Canadian Institute of Mining and Metallurgy (Ottawa Branch), Chairman of Nominations Committee and Past Chairman.

Youth Science Foundation, Executive Committee, member representing the Geological Association of Canada.

21st Ottawa Regional Science Fair, Earth Science exhibits, Judge.

J.M. Duke

International Geological Correlation Programme, Project 161 "Sulfide deposits in mafic and ultramafic rocks", participant.

Mineralogical Association of Canada, secretary.

Editorial Board, Economic Geology.

Mineralogical Association of Canada, auditor.

A.G. Fabbri

International Association on the Genesis of Ore Deposits: Commission on the Tectonics of Ore Deposits, secretary-treasurer; Working Group 3 - Statistical Treatment of Tectonics and Mineral Deposit Data, secretary.

D.C. Findlay

Geological Association of Canada, Fellow.

Mineralogical Association of Canada, member.

Canadian Institute of Mining and Metallurgy, member; Geology Division, councillor.

Canadian Institute of Mining and Metallurgy 1984 Annual General Meeting, Geology Division, Program Chairman, Ottawa.

Working Committee on Northern Mineral Resource Assessment, Co-chairman.

Centre for Scientific, Engineering and Learned Societies, Board of Directors, member.

Geological Survey of Canada Ad Hoc Committees: Research on the Origin of Mineral Deposits, Chairman; Methods in Resource Assessment, co-chairman.

S.B. Green

Canadian Institute of Mining and Metallurgy, Ottawa Branch, Executive Committee, member.

G.A. Gross

Canada-USSR Mixed Commission on Economic, Industrial Scientific and Technical Cooperation; Geology Working Group, Co-chairman and coordinator.

Coordinating Committee on Ocean Mining for Department of Energy, Mines and Resources (DCOM); member and Chairman of DCOM Working Group on Deep Ocean Mineral Resources.

Geological Survey of Canada-Energy, Mines & Resources Task Group on Submarine Metalliferous Hydrothermal Systems.

International Geological Correlation Programme, Project 91 - Metallogeny of the Precambrian - Canadian Chairman and coordinator; Project 132 - Basins of Iron Formation Deposition (terminates in 1983) - Canadian Chairman; Project 111 - Genesis of Manganese Ore deposits - Canadian Liaison and coordinator; New Project on Iron Formation and Related Metalliferous Sediments, Canadian leader.

Precambrian Research, Editorial Board.

R.V. Kirkham

Canada-Nova Scotia Mineral Development Subsidiary Agreement, Geotechnical Advisory Subcommittee, member.

Logan Club 1981-1982, chairman.

Canada-Newfoundland Geoscience Planning Ad Hoc Committee, Buchans research project, member.

Penrose Medal Committee, Society of Economic Geologists.

R.M. Laramee

Energy, Mines and Resources Computer Science Centre Data Management User's Group, Chairman.

C.R. McLeod

Energy, Mines and Resources Committee for Ocean Mining, Working Group for Deep Ocean Mining, member.

Geological Survey of Canada, Safety Committee, member.

W.H. Poole

Canada-Newfoundland Mineral Development Program, Geological Mapping Subcommittee, member.

International Geological Correlation Programme, Project 27 - Caledonide Orogen, Canadian Working committee, secretary.

Geological Survey of Canada Liaison Officer to government geological surveys of New Brunswick, Nova Scotia and Newfoundland.

V. Ruzicka

Energy, Mines and Resources Uranium Resource Appraisal Subcommittee on Estimated Additional Resources, chairman.

Steering Committee for Nuclear Energy (Organization for Economic Cooperation and Development Nuclear Energy Agency) Steering Group on Uranium Resources, member.

Elsevier Scientific Publishing Company, Editorial Board of 'URANIUM', member.

Working Group of Project V, International Atomic Energy Agency (Lower Proterozoic Vein Type Deposits) member.

Working Group of Project III; International Atomic Energy Agency (Uranium deposits in Proterozoic Quartz-Pebble Conglomerates); member.

D.F. Sangster

Carleton University, Ottawa, Honorary Adjunct Professor.

International Geological Correlation Programme, Project 60 - Correlation of Caledonian Stratabound Sulphides, Canadian National Representative.

Mineralogical Association of Canada, Short Course Organizer for 1983 Annual Meeting.

Society of Economic Geologists, Publications Committee, member; Nominations Committee, member.

W.D. Sinclair

Canadian Institute of Mining and Metallurgy, Ottawa Branch Executive (Sessions and Services Committee), member.

R.I. Thorpe

Mineralogical Association of Canada, Associate Editor.

Interdepartmental Working Committee on Northern Mineral and Energy Resource Assessments, member.

Attendance at meetings, conferences and courses

J.M. Franklin

Geological Association of Canada Meeting, Winnipeg, May, 1982.

Canadian Institute of Mining and Metallury, April, 1982.

Canadian Geoscience Council, Vancouver, Toronto, Ottawa.

Carnegie Institute Workshop "Role of the seafloor scientist and policy making in government".

CIM University visiting lecturer to Western Ontario Universities (2 talks, Gold deposits in the Canadian Shield).

GAC Winnipeg Section, "Gold Deposits of Central Canada".

Institute of Northern Studies, McGill University, November "Mineral Potential of the Boreal Forest".

Dept. of Geology, McGill Univ. "Pb Isotope systematics and their application".

GAC-MEG, Vancouver "Gold deposits in the Canadian Shield".

Boreal Forest Eco system Symposiom, Thunder Bay, "Resources of the Boreal Forest".

Toronto Geology Discussion Group "Gold Deposits in the Canadian Shield".

GAC-MAC Meeting, Winnipeg; 3 talks "Metallogeny of the Northern Lake Superior Rift", "Metamorphism of alteration zone, Anderson Lake Mine", "Alteration of Archean Volcanic Rocks".

Carleton University, short course on metavolcanic rocks, talk on "Alteration associated with massive sulphide deposits.

Carleton University, Graduate course, 25 lectures on alteration and hydrothermal systems.

Current Activities Forum "Gold Deposits Research, Geraldton, Ontario and Snow Lake, Manitoba.

Geological Association of Canada, Special Volume on "Precambrian Stratiform Ore Deposits", co-editor.

Geoscience Canada, Associate Editor.

Economic Geology, Associate Editor.

Canadian Geoscience Council, member.

Canadian Institute of Mining and Metallury, Geology Division, Chairman of the Research Committee and CGC representative.

Geological Association of Canada, Mineral Deposits Division, councillor.

Geological Association of Canada, councillor.

Energy, Mines and Resources Thrust Proposals Federal-Provincial Consultation Committee, member.

Research in Exploration for Mineral Deposits; CGC Task Group, member.

GEOLOGICAL INFORMATION DIVISION

R.G. Blackadar

The Geological Information Division is responsible for ensuring that the results of the Branch scientific programs are made available to users in a timely and effective manner; to maintain the Library of the Geological Survey as the principal earth science library in Canada; to manage the National GEOSCAN Centre, which co-ordinates the activities of a federal-provincial bibliographic data base; to provide advice to Branch management on the application of data systems; to provide comprehensive drafting and cartographic services; to provide a Branch public information service; and to maintain expertize and provide service in technical photography.

The division operates through six sections, Scientific Editing and Publication, Library, Data Systems Group, Cartography, Technical Photography, and Publications Distribution.

The stated activity objective of the Geological Survey is "to ensure the availability of a comprehensive knowledge base on the bedrock and surficial geology, and the energy and mineral resources of Canada". This is the rationale for all work carried out by the Branch. Inherent in this objective is the transmission of knowledge to users. The dissemination of scientific information is the objective of this division. Our users are diverse and include specialists in government, industry, and universities as well as the general public. Fields of interest are as varied as the disciplines studied by the operating divisions of the Branch. The published output of this reporting unit must recognize this diversity and yet do so in an economical manner.

Most of the manuscripts processed and published come from Branch scientists thus any major shifts in Branch activity have a direct effect on our program. Because manuscripts are not submitted regularly throughout the year but tend to bunch, backlogs sometimes develop but the staff allotted to the publication activity is adequate to meet the annual demand.

Written communication is still the most common way by which knowledge is transmitted and our publication program is our principal activity. This is supported by scientific and production editing, cartographic and photographic services. A corollary of this is the need to collect and make available to our research staff and others the published output of others. The Geological Survey library, a part of this division, is considered to be the principal earth science component of the National Library, and its collections and services are widely available.

Although written communication remains a prime method for information transfer in the world of science, data systems are becoming increasingly important. Since 1976 the Department of Energy, Mines and Resources has carried out work directed to the development of an earth science bibliographic data base. The data base is managed on behalf of seven provinces, EMR and Indian and Northern Affairs by the National GEOSCAN Centre, a part of the Library.

The increasing use of data systems led the management of the Geological Survey to establish a Data Systems Group in 1974. This group was transferred to Geological Information Division in 1979. It provides specialist service to other divisions and advises senior management on computer use.

Although much of the drafting and cartography done in the division is in support of the publication program there is a continuing need for casual drafting services. These vary from preparing figures for publication in outside journals to preparation of slides for lectures or graphics needed for displays. Another support service provided is the preparation and printing of photographic materials. Custom service is offered in the preparation of photomicrographs of fossils, thin sections and polished sections. Many of these are used as illustrations in published reports.

The division acts as the focus for Public Information services. To facilitate access the Director's telephone number is listed in various directories. The service is maintained by the scientific editors and is strictly a subsidiary service which does not aim to provide the comprehensive public service available in some scientific agencies. However the arrangement, when coupled with the Reference Service provided by the Library and the information given to the public through the Publication Distribution Office, appears acceptable as no complaints have been received from the public.

During 1982/83 three volumes of "Current Research" were published comprising 992 pages. In January the Branch Management Committee agreed to a proposal that in future "Current Research" be published semi-annually, in mid-January and in mid-July. No change in the volume of material is likely but the change to two volumes will facilitate production.

During 1982/83 we published

6	memoirs
17	bulletins
24	papers
1	miscellaneous report
1	economic geology report
33	multicolour maps
19	2-colour maps

About 4500 printed pages of text were published (including "Current Research".) This material was handled by the English and French scientific editors in this division and by English language editors at ISPG and in Terrain Sciences.

Personnel Notes

Ms. Gywnneth Martin, Head, Data Systems Group left in early September 1982 to take up a position at Treasury Board. Dr. Phyllis Charlesworth was appointed through competition to fill this vacancy and assumed her new duties in April 1983.

Mr. P.J. Griffin was appointed to the position of Assistant to the Director effective 1 April 1983 and became responsible for participating in all day-to-day divisional management activities. In addition he is continuing to participate in the scientific editing activity.

Mr. J.G. Roberts, Chief, Cartographic Section since 1975 was given a Special Assignment effective 1 March 1983 and extending to 1 March 1984 the date of his planned retirement. Included in his assignments are participation in a study of the Classification Standards for the Drafting and Illustration Group being carried out on behalf of Treasury Board, and an evaluation of the various applications of computer-assisted (cartography that have been implemented in various departments. The latter study is being used in establishing long-term plans in GSC.

Marie-France Dufour joined the staff of the Scientific Editing and Publication Section in September as a Scientific Editor (French) to meet the needs generated by an expanding program for scientific publications in the French language.

Attendance at Meetings, Conferences and Courses

R.G. Blackadar
Geological Society of America, New Orleans, October 1982
DNAG Steering Committee; Boulder, Colo., May 25, 1982
GEOSCAN Management Subcommittee; Toronto, March 1983

P.J. Griffin
Association of Canadian Map Libraries

Membership on Committees

R.G. Blackadar
- Branch Management Committee
- Branch Standing Committee on New Technology for Data Acquisition
- EMR Computer Policy Committee
- Departmental Committee on Scientific Publications in both Official Languages.
- Earth Science Sector Committee on Communications
- Chairman, GEOSCAN Management Subcommittee, NGSC
- Member, Steering Committee, Decade of North American Geology

P.J. Griffin
Interdepartmental Committee, National Earth Science Series of 1:1 million maps.

DATA SYSTEMS GROUP

K.L. Gunn (Acting Head)

The Data Systems Group provides consulting services to the Divisions, advises Branch Management on EDP matters, carries out Branch EDP administrative functions, and provides for the continuing operation and support of Branch systems.

In the consulting area, the Group provided the Cartography section with an improved system for operation of the Branch digitizing facilities. Some further developments of the GEOFFREY system (for management of marine geological data) were worked on with staff of the Atlantic Geoscience Centre. In the GEOSCAN project, conversion of bibliographic records from the Department's CYBER was completed, the Section staff aided the National GEOSCAN Centre in various areas of the switchover to the new production system, MINISIS, on HP3000 equipment. Investigations began toward computer support of the GSC furniture and equipment inventory operated by Administrative Services, to be put in place during 1983-84. The Division's APPLE II computer was made available to Branch users for evaluation of possible microcomputer applications, and assistance was provided to new users.

Management and users from throughout the Branch obtained general advice and assistance from the Data Systems Group in planning and arranging EDP services and equipment; particular examples were the acquisition by the Cordilleran Geology Division of mini computer facilities for the staff of the Vancouver office, and participation in the Departmental study of Alternate Computing Requirements.

The Group compiled and submitted the Branch EDP Report and Plan to the Department, established a comprehensive Branch inventory of EDP equipment, and coordinated Computer Science Centre requirements for handling of computer accounts.

Continuing support was provided for the operation of the Branch EAI plotter and the Geological Information Division's Status of Publications data base.

Committees

G.M. Martin – Chairman, Computer Working Committee

Personnel Changes

In April, J. Gallace left the Group after 1 year to join the Department of Transport.

In September, G.M. Martin, who had been with the Data Systems Group since 1975, left the Geological Survey to join the Administrative Policy Branch of the Treasury Board; K.L. Gunn was Acting Head for the remainder of the year.

LIBRARY SERVICES

A.E. Bourgeois

CURRENT YEAR ACTIVITIES

1. Library Administration

The Official Languages Division together with the EMR Standing Committee of Head Librarians prepared a report for Senior Management on improving bilingual access to the departmental libraries' collections.

In a joint GSC – CANMET – Surveys and Mapping endeavour, Systemhouse Ltd. was hired to study the feasibility of using the MINISIS database management system to provide in-house automated functions for EMR libraries.

Performance measurements were developed for library operations and will be fully implemented in fiscal year 1983/84.

2. Information Services

This year was notable for a significant jump in library usage. Reference and Circulation outputs increased by more than 30% and Map library circulation went up by 50%. Because of streamlining of operations this increase was absorbed by existing staff. However if this increase were to continue it is doubtful that present staff could continue to provide existing levels of service.

Several documents were produced this year:

- A procedures manual
- A list of current indexes to Canadian provincial publications in geology
- A new brochure for computer-based Geoscience information services

A list of GSC Library holdings was prepared for input into the Union List of Geologic Field Trip Guidebooks, 4th ed.

Promotion of the library's computer-based services was highlighted by a poster session at the GSC Current Activities Forum.

A systematic revision of CAN/SDI profiles was begun. The result should improve the quality of the profiles.

The map series kardexing project is now 90% complete, resulting in improved access to the map collection. Systematic development of the map collection is underway.

3. Technical Services

The high turnover in staff (3 resignations, 1 secondment, 1 language training and 1 maternity leave) caused a drop in Technical Services output in certain areas. The output per person-year, however continues to be high. The backlog resulting from this high turnover should be dealt with in the next year.

The 1982 "List of Serials held in the Geological Survey of Canada Library" was published as GSC Paper 83-17.

The first union catalogue of EMR libraries was issued in December 1982.

"Manuel des Services techniques de la Biblothèque" was issued in its first draft.

Retrospective conversion of USGS translations was completed; conversion of GSC translations was commenced during the reporting period.

A project to resolve problem subscriptions and standing orders was initiated.

A program for automated financial reporting system for library acquistions was designed.

4. National GEOSCAN Centre

The GEOSCAN/MINISIS system was fully implemented in June 1982 and by March 1983 65,000 records were loaded into GEOSCAN using the computer facilities at ISPG. The links required to create products were established, a batch method for validating and entering data into GEOSCAN was identified, and seven new print formats were created.

The following documents were prepared and updated:

Terminal Operator's Guide to GEOSCAN/MINISIS

GEOSCAN Indexing Tools

GEOSCAN Conversion Documentation

In May 1982, 17 indexers were trained on the use of the new GEOSCAN/MINISIS system and the new data field structures.

The GEOSCANMEMO is now being produced in both official languages. Also, in order to enhance communication between participating agencies an Electronic Mail system was tested and implemented in April 1982.

PLANNED/PROPOSED ACTIVITIES

Information Services

1. Systematic revision of CAN/SDI profiles will be completed.
2. Map kardexing project will be completed.
3. 600 map records will be input on UTLAS, providing bilingual subject access.
4. An analysis of collection use statistics will be undertaken to enable the weeding of little used material and the conversion of less used material to microfilm.

Technical Services

5. Extend bilingual access to the collection by creating French subject headings.
6. Continue the retrospective conversion of GSC translations.
7. Review the acquisitions section's procedure and explore the feasibility of automating its functions.
8. Determine a more efficient manner of ordering subscriptions presently placed directly with the publishers.
9. Explore the feasibility of inputting ISPG records on UTLAS.

National GEOSCAN Centre

10. NGC expects to train and commence indexing activities at 2 new geoscience organizations in 1983/84 (PEI and CSPG).
11. A first draft of the GEOSCAN Indexing Manual will be prepared.
12. Modifications will be made to the GEOSCAN data base structure in order to improve bilingual capabilities.
13. Manual cleanup of the converted records will be started.
14. The method for Batch entry of data into GEOSCAN will be tested and documented.
15. Conversion of Quebec and CPSG records will be started.
16. A HP3000 minicomputer will be acquired and GEOSCAN/MINISIS will be transferred to this new facility.

PERSONNEL CHANGES

Information Services

Doug Tedford took over as Head of Reference and Circulation in an acting capacity while Rosemary Swan was on Maternity Leave.

Pam Strachan was hired on term to fill the position of Interlibrary Loans co-ordinator.

Robin Nagy was hired on term as Interlibrary Loans Co-ordinator when Pam Strachan left to take a permanent job.

Lori Mercer replaced Gary Connors as photocopy clerk.

Technical Services

Eva Klobouk was hired as a cataloguer (term appointment).

Karen Yates joined the technical services section as a cataloguer (term appointment).

Gary Connors was hired as the acquisitions clerk (term appointment).

Richard Butterfield worked in technical services for 3 months before joining the Office of Policy Coordination and Communications, Earth Sciences Sector, EMR.

National GEOSCAN Centre

Wendy Stark was seconded from the Technical Services section of the GSC Library to work on GEOSCAN-related projects.

Richard Butterfield left NGC in May 1982 on a secondment to the Property Planning and Management Group of EMR.

Rita Laprade left NGC in July 1982 to take a position in the Office of Policy Coordination and Communications, Earth Sciences Sector, EMR.

The NGC Secretary position was filled on a term basis in September 1982 by Minx Lockwood.

COMMITTEE MEMBERSHIP

S.O. Alexander

- EMR Cataloguers' Working Committee.
- Ottawa-Hull UTLAS Users' Committee.

A.E. Bourgeois

- Association of Chief Librarians of National Geological Surveys, member of the executive committee.
- Member of the Steering Committee of the Council of Federal Libraries.
- Convener of the Committee on Collection Rationalization, Council of Federal Libraries.
- Chairperson of the EMR Standing Committee of Head Librarians.
- Secretary to the Ad Hoc Departmental Library and Information Committee.

Elizabeth Frebold

- Committee on Conservation/Preservation of Library Materials, Council of Federal Libraries.

L.A. Frieday

- EMR Cataloguers' Working Committee.
- Ottawa-Hull UTLAS Users' Committee.

Tara Naraynsingh

- Treasurer, Association of Canadian Map Libraries.
- Ontario editor, ACML Bulletin.
- ACML 1982 Conference Committee.

David Reade

- Chairman of the National GEOSCAN Database Committee.
- Ex-officio member of the GEOSCAN Management Subcommittee (subcommittee of the National Geological Surveys Committee).
- EMR representative on the MINISIS User's Group.

W.P. Stark

- Vice-chairperson, Documentation General Interest Group of CHANGE (UTLAS National Users' Group).
- EMR Cataloguers' Working Committee.
- Serials Interest Group, Canadian Library Association.
- National GEOSCAN Database Committee.

Rosemary Swan

- Ottawa On-Line Users' Group.

Judy Wilks

- Ottawa On-Line Users' Group.
- CAN/SDI Centres Committee.

CONFERENCES ATTENDED

Association of Canadian Map Libraries, Annual Conference, 1982, Ottawa.

Annette Bourgeois
Elizabeth Frebold
Irène Kumar
Tara Naraynsingh

DESCRIPTIONS		1979-1980	1980-1981	1981-1982	1982-1983
1. A. Information Requests		3,845	5,809	7,941	11,366
B. Automated Searches		509	700	1,463	1,964
2. Document Delivery					
A. Lending		23,097	26,974	27,321	34,496
B. Borrowing		895	569	828	1,277
3. Collection Growth					
A. Monographs	(Title)	978	1,164	1,153	726
B. Serials	(Issues)	12,172	13,099	13,507	14,510
C. Serials	(Title)	–	–	31	36
D. Maps	(Sheets)	1,184	1,669	3,082	2,660
E. Microforms	(reels/sets)	91	1,147	1,881	4,520
F. Total linear metres		–	83	99.4	103
4. UTLAS					
Records added to database		–	1,685	2,938	2,705
5. GEOSCAN					
A. Records added to database:	on-line	–	–	–	–
	batch	–	–	–	3,625
	Total	–	–	–	65,502
		–	–	–	69,127
B. Custom indexes		–	–	–	11
C. On-line retrievals		–	–	–	34

Canadian Association of Information Science,
Annual Conference, 1982, Ottawa.

Samuel Alexander
Annette Bourgeois
Elizabeth Frebold
Rosemary Swan
Douglas Tedford
Judy Wilks

Canadian Library Association,
Annual Conference, 1982, Saskatoon.

Annette Bourgeois
Wendy Stark
Judy Wilks

Geological Information Society (GSA),
Annual Conference, 1982, New Orleans.

Annette Bourgeois

International Conference on Geological Information
(2nd, 1982, Golden, Colorado)

GEOLOGICAL CARTOGRAPHY SECTION

E.A. Dumbrell

Productivity in the reporting year was comparable to the previous fiscal period. However, the goal to have throughput time on jobs reduced remained elusive. Jobs were normally put into production soon after receipt in the Production Control area due to lack of backlog in units.

Breakdowns in the Gradicon digitizing table caused delays on several occasions. The problem was further complicated since the Bendix table had been discarded as too costly to repair and service. A review of the condition status of all equipment in the work area together with recommendations will be made by the new System Analyst in the near future.

- Three new drafting "stations" were purchased to replace aged drafting tables the conditions of which are quickly deteriorating. Eventually all substandard equipment will be replaced over an extended time period as budgetary demands allow.
- The photomechanical operation was fortunate in that no production time was lost due to major equipment breakdown. However the automatic film processing machinery is rapidly overtaking what is considered useful life, and must soon be replaced. The need for new automatic closing light-safe doors is also considered a high priority requirements in this area.
- Work continued on the new bilingual edition of the Standards & Specifications book. However, more pressing commitments and on-going revisions have delayed final completion. Probable publication is slated for the fall of 1983, barring further major interruptions.
- In June of this year, a group of cartographic personnel visited the APH Limited typesetting facility to review their operation and to investigate how their equipment and know-how might be able to assist the Unit should it be necessary to go to outside agencies for our type requirements.

Since the Surveys and Mapping Branch had not finalized their operational plan for this type of service, it was felt the options offered by private concerns could satisfy our needs if necessary. The Surveys and Mapping Branch has now implemented their new updated typesetting capability, however difficulty is being experienced in the adoption of this system to meet all our requirements and until such times as the minor problems are corrected we will still utilize their old system to fill our needs.

Major Project Undertaken

- The revised edition of the 1:5 000 000 Map 1255A Magnetic Anomaly Map of Canada was in production at years end. This sheet will now be printed in bilingual form for the first time.
- Production commenced on the 1:5 000 000 Map 1588A Barium, Strontium, and Fluorine Deposits in Canada.
- Due to the heavy demand for the Status of Mapping sheet, it was decided to produce this item in the "A" series format with some revisions to format. The new title to be Map 1580A, Systematic Regional Investigations in Canada (1st edition), produced as separate English and French editions. It is anticipated further modifications will be made in the subsequent edition if possible to allow for a bilingual format.
- Production commenced on the 1:2 000 000 Map 1513A, Mineral Deposit Map of the Cordillera.
- Preliminary work started on providing compilation mosaic bases for future production of 1:5 000 000 Radiometric Anomaly Map of Canada.

Co-operative Projects (Branch and Departmental)

- Printing of the revised 32nd edition of Map 900A, Principal Mineral Areas in Canada in separate English & French editions. (Mineral Policy Sector and Geological Survey).
- Cartography prepared a 16 panel display for the GAC in Victoria, May 1983. (Geological Survey, Earth Physics Branch).

PRODUCTION DATA	1981-82	1982-83
Automated digitizing		
Line mode (Econ. Geol. Div.)	55	5
Point mode (Terrain Sciences Div.)	10	2
&		
(Resource Geophysics and Geochemistry Div.)	34	27
	99 Days	34 Days

Twenty-seven map projections at various scales were prepared with the co-operation of Surveys and Mapping Automation System personnel.

Checking Unit

	1981-82	1982-83
"A" Series maps checked at proof stage	17	22
"B" Series maps checked at proof stage	24	12
Pocket, page figures, miscellaneous	24	54
	65	88

There were 375 miscellaneous (Z numbered) drafting jobs completed during the year, which took 13 834 person hours. In addition to the normal map production operations, the photomechanical unit processed 1155 (X numbered) miscellaneous jobs for various authors and Divisions.

A total of 267 requisitions for Linofilm typesetting for Ottawa, Calgary and Dartmouth cartographers were processed through S & M Branch. There were 474 master topographical negatives requisitioned from S & M Branch for reproduction in Photomech. for authors and cartographers in Calgary, Ottawa and Vancouver.

Maps and illustrations received during the fiscal year:

	1981-82	1982-83
Multicoloured geological maps	32	19
"B" Series maps	42	16
Figure illustrations (pocket)	40	7
Figure illustrations (page)	331	204
Geophysical Maps and Indexes	43	0
Multicoloured maps reprinted	7	8
Preliminary geological maps reprinted	3	1
Figure illustrations (pocket) reprinted	4	7
Indexes to Publications revised	15	25
Camera	6 478	7 526
Contacts		
Film and papers	21 451	22 258
Colour Keys	821	604
Peelcoats	298	283
Scribetches	1	1
Colour Proofs	100	92
Whiteprints	6 560	5 935

Carry-over of maps and illustrations in progress at the end of fiscal year:

	1981-82	1982-83
Multicoloured geological maps	45	31
"B" Series maps	20	4
Figure illustrations (pocket)	6	10
Figure illustrations (page)	76	34
Open File maps	0	13
Geophysical Maps and Indexes	0	48

CARTOGRAPHIC STAFF

Strength remained at fifty-four (54) person years and functional deposition remained constant. There were four (4) retirements (plus a vacancy carry over), two (2) promotions and three (3) vacancies filled by GSC/PSC competitions. Two (2) vacancies existed at years end.

- J.G. "Mick" Roberts chose to step down as Superintendent of Cartography effective March 1, 1983. Pending his official retirement in March 1984 he will be engaged in a variety of special projects, acting in an advisory capacity to the Division Director. A triumvirate consisting of E. Dumbrell, F. Williams and J. Bill will carry on until such time as a successor is chosen.
- Retirements depleted our ranks somewhat – H. Kovachic was the first to depart, followed by L. Champagne, P. Debain and M. Raddatz.
- To help fill and void, M. Hudon and J. Narraway were taken on strength, coming to us from other federal mapping agencies. F. Williams was the successful candidate in the competition for the vacated Unit Supervisory position and G. Currie, also by way of competition transferred from Publications (GIC) to the post of Clerk, Production Control, Costing and Operational Services.

MEETINGS, SEMINARS, COURSES, ETC.

Cartographic Workshop – O.I.C.C. – Lindsay, Ontario May-June 1982

J.P. Corriveau, S. Junginger-Frohberg, J.G. Roberts, N. Grenier, J. Yelle, R. Saffin, F. Williams, J. Pratt, J. Bill

Graphic Arts – Ottawa, Ontario October 1982 (Night)

J. Pratt, L. Renaud, M. Sigouin, P. O'Regan

Basic for Minis - Module I – Ottawa, Ontario November 1982

R. Saffin

Problem Solving and Decision Making – Ottawa, Ontario Departmental Training, October 1982

R. Daugherty, J. Bill, F. Williams, E. Dumbrell

Performance Review & Employee Appraisal – Ottawa, Ontario Departmental Training March 1983

E. Maahs, M. Di Millo, Y. Yelle, J-P. Corriveau, V. Foster

Performance Improvement – The Problem Employee – Ottawa, Ontario April 1982

J. Bill

Staffing for Line Manager – Ottawa, Ontario May 1982

J. Bill, F. Williams

E. Maahs and V. Foster returned to the Unit from language training to resume their duties as cartographic supervisors.

MEMBERSHIP ON COMMITTEES

F. Heney
- Branch Safety Committee

J-P. Corriveau
- Departmental Suggestion Awards, Cartographic Committee
- Branch Energy Conservation Committee

J. Bill
- Board of Directors, Ontario Institute of Chartered Cartographers
- Drafting & Illustration Classification Standards Review Committee
- Interdepartmental Map Design Committee

S. Frohberg
- Board of Directors, and Secretary, Ontario Institute of Chartered Cartographers

PUBLICATIONS/INFORMATION OFFICE

J.L.L. Touchette

The following publications were received during the year:

Economic Geology	1
Memoirs	6
Memoirs (reprinted)	2
Bulletins	17
Preliminary Papers	24
Preliminary Papers (reprinted)	2
Misc. Report Series	1
Misc. Geology	21
Open Files	2
Microfiche	8
Maps "A" Series	33
Maps "A" Series (reprinted)	5

Preliminary Maps	19
Preliminary Maps (reprinted)	3
Geophysical Series	85
Geophysical Series (reprinted)	65
Revised Indices to maps	24

DISTRIBUTION DATA

Maps	58 622
Reports	37 148
Indices, listings, posters, etc.	119 666
Total distribution (free and paid)	215 436

OTHER DATA

Requests for information, publications, rock and mineral sets, etc.	1 980
Visitors (cash sales 1151) (others 2036)	3 187
Notification Lists sent out	12

REVENUE

Derived from sales of reports, maps, rock and mineral sets, photographs, etc.	*$126 542.80

*Unadjusted

($ value) Products supplied to regional offices	53 764.50
TOTAL SALES VALUE	$180 307.30

PHOTOGRAPHIC SECTION

J. Kempt

The photographic section of the Geological Survey of Canada provides a broad range of services in B&W and colour to the members of the Survey, at times to other Government Depts., and on occasion to private organizations, companies, and individuals who work in collaboration with the geologists of the GSC.

The photographic assignments, carried out by the staff of the photo section, may be broken down into work done by (1) the colour studio and darkroom (2) the fossil studio darkroom (3) the copy studio and darkroom (4) darkrooms for printing, enlarging, and processing.

Colour Studio

The colour studio provides for members of the Geological Survey the following services the production of colour slides, duplicate slides internegatives, view graphs. Photographs of rock and mineral hand specimens, drill core samples and photographic displays. Colour prints are provided from Kodak colour materials and from Ciba colour materials.

Fossil Studio

The fossil studio supplies photographs of fossils such as, ammonites, tribolites, pelecypodes, belemnites, crinoids, and fossil corals. Rocks specimens are photographed to show their mineral content, thin sections of fossils, minerals, and rock specimens are also done in plain, and polarized light to show birefrengent material.

Sittings may be arranged for passport and publicity photographs.

The fossil studio is equipped, as well, with a background light table and accesories to provide access to reflective and incident light techniques.

Copy Camera Studio

Equipped with a 4 x 5 view camera, a 8 x 10" copy camera and a multiphot macro camera the studio produces, copies of documents, photographs, seismic records. Close ups of sandgrains, crystals, tiny fossils are photographed by means of the multiphot macro camera at magnifications up to X30.

Specialized jobs such as reproduction of printed circuits; the use of ultra violet and infared light to reveal hidden propreties of specimens are carried out in copy studio as well.

Darkrooms

Printing and enlarging for the Geological Survey is carried out with the aid of Omega, Durst, Leitz, Bessler enlargers. Two Gordon Morse printers which have been modified by the Geophysics and Geochemistry Division to accept resin coated, as well as fibred based papers, provide the printing facilities.

Processing of prints and enlargements is done manually or by means of an Ilford 2000 automated processor.

Courses

Miss Jean White spent some time at the Winona School of Professional Photography in Indiana updating her skills and improving her techniques.

Arrivals

R.J. Kelly was the successful candidate in the competition to fill the vacancy left by Gilles Lemieux who has now moved into the colour studio.

I would like to bring to the attention of the staff of the GSC that all roll film brought to the photographic section for processing and printing is sent out to the Govt Photo Centre at Tunney's Pasture.

G.S.C. PHOTOGRAPHIC SECTION

PRODUCTION REPORT

Year 1982-1983

PHOTOGRAPHS PRODUCED	B/W NEGS	COLOUR NEGS	COLOUR TRANSP	TOTAL EXPOSED
Equipment-Labs-Portraits-Passports	261			261
Continuous tone maps-charts	1451		3420	4871
Line copies	1823			1823
Rock & mineral Specimens	81		445	526
Thin Sections	199		722	921
Polished Specimens				
Auto-Radiographs	3			3
Requisition Processing COL. ROLLS			1080	1080
Requisition Processing B/W ROLLS				
Duplicate Slides			1328	1328
B/W Negs from Colour Slides (internegatives)	940			940
Fossil Negatives	1042			1042
TOTAL PROCESSED	5800		6995	12795

PRINTS & ENLARGEMENTS	EXPOSED	PROCESS	DRIED	
Black and White	10305	10305	10305	
Colour	2760	2760	2760	TOTAL
	13065	13065	13065	39195

Prints & Enlargements Numbered & Stamped	8484
Prints & Enlargements to outside Agencies	455
Colour Slides	7932
B & W Slides	1923
Slides mounted	8349
Negatives Opagued	2417
Negatives Retouched	495
Prints spotted	446
Prints from Gov't Photo Centre - B&W	2967
Prints from Gov't Photo Centre - Colour	334
Negatives Indexed	530

		TOTAL
	34332	59922

GRAND TOTAL	99117

INSTITUTE OF SEDIMENTARY AND PETROLEUM GEOLOGY

W.W. Nassichuk

Introduction

The Institute is charged with the responsibility of establishing a sound geoscience base for the sedimentary basins of western and Arctic Canada, which occupy one-third the area of the country and contain most of Canada's oil, natural gas, and coal resources. In addition, units of the Division are responsible for the appraisal of the hydrocarbon and coal resource potential of the country.

The geological framework is being broadly outlined by current mapping and topical studies. These studies, together with paleontological investigations, support exploration for, and assessment of the non-renewable resources of western and northern Canada. Emphasis on energy resources has resulted in development of evaluation programs in both petroleum and coal, each supported by petrological investigations. The geological evaluations contribute to the national inventories on the resources of petroleum and coal.

The Institute is organized into six subdivisions: Regional Geology, Paleontology, Coal Geology, Petroleum Geology, Geological Information and Administration, each comprising several sections; together with the Petroleum Resource Assessment Secretariat.

Regional Geology carries out standard mapping, lithostratigraphic and sedimentological studies in the principal sedimentary basins of Western Canada, Northern Mainland, Arctic Islands and adjacent offshore areas. Paleontology ensures precise and consistent biostratigraphic correlation, by refinement, through detailed taxonomic and stratigraphic studies, of the biochronologic scale which serves as the basis for biostratigraphic correlation. The Coal Geology Subdivision is responsible for providing the estimates of Canada's coal resources, for development of the National Coal File by accumulation of data, and for the development of regional models of coal occurrence. The Petroleum Geology Subdivision objectives are to identify the oil and gas resource base of Canada and to determine the probable distribution and potential abundance of oil and gas resources. The Geological Information Subdivision is concerned with processing, publication and dissemination of information on Canada's sedimentary basins and resources. Activities in the four scientific subdivisions at ISPG, that is the Regional Geology, Paleontology, Petroleum Geology, and Coal Geology Subdivision reflect the four Strategic Objectives of ISPG as follows:

1. To map, describe and explain the bedrock geology of sedimentary basins in western and northern Canada.

2. To develop and modify biochronologic standards essential to correlation and comprehension of bedrock geology in the sedimentary basins of western and northern Canada.

3. To assess the probable distribution and potential abundance of the oil and gas resources of Canada.

4. To investigate the geology of coal deposits in western and northern Canada; to determine extent, quality and quantity of selected coal deposits; to develop a National Coal Data File as an integral part of the National Coal Inventory.

The Administration Office provides financial services, central registry, stationary and supplies, and office services including the Word Processing Centre. ISPG maintains and administers its building owned by the Department of Energy, Mines and Resources, and as a result building and engineering services are an important component within Administration.

The present establishment of the Institute is 147 person years including 76 scientific and professional positions, 8 operational, 35 technical, 3 administrative and 25 administrative support positions.

A repository is maintained for samples, core and other data resulting from both onshore and offshore exploration drilling by industry in the Yukon Territory, the Northwest Territories, including the Arctic Islands and for samples from all provinces and continental shelves of western Canada. Most of the material is available to the public for free examination and is used by the ISPG in research activities.

Attendance at Meetings, Conferences and Courses

W.W. Nassichuk

Branch Management Committee Meeting, April 1982.

Niagara Institute Seminar, Cranbrook, Vancouver, May 1982.

Petroleum Resource Appraisal Panel Meeting, Ottawa, June 1982.

Meeting with B.C. Ministry of Energy, Mines and Petroleum Resources, Victoria, B.C., August 1982.

Comité Arctique, Conference on Arctic Resources, Oslo, September 1982.

Meeting with Alberta Research Council, Calgary, October 1982.

Branch Management Committee Meeting, Ottawa, October 1982.

Branch Management Committee Meeting, Ottawa, November 1982.

Meeting with ISPG-Industry Liaison Committee, Calgary, November 1972.

Meeting with Alberta Geological Survey, Calgary, November 1982.

Branch Management Commitee Meeting, Ottawa, January 1983.

Executive Orientation Course, Touraine, Quebec, February 28-March 11, 1983.

J.E. Brindle

Session Chairman, 4th International Williston Basin Symposium, Regina, October 4-7, 1982.

J. Andrechuk

Business Administration 101, Calgary, September to December 1982.

NBI Word Processor Training, Calgary March 7-11, 1983.

Special Talks and Lectures

W.W. Nassichuk

"Petroleum Resources, Arctic North America and Greenland", Comité Arctique Conference on Arctic Resources, Olso, Norway, September 1982.

"Geology and Petroleum Resources, Arctic North America and Greenland", ISPG, Calgary, January 1983.

Membership on Committees

W.W. Nassichuk

Vice-Chairman and Secretary, Subcommission on Permian Stratigraphy, International Union of Geological Sciences.

Chairman, North American Working Group on Middle Pennsylvanian of North America.

Co-Chairman, Working Group on Permian Stratigraphy on Boreal Relations.

Member, Organizing Committee for 3rd North American Paleontological Convention, Montreal, 1982.

Editor, Tectonic Volume (Compté Rendu) Carboniferous Congress.

J.E. Brindle

Chairman, ISPG Ad Hoc Committee on Open House.

Chairman, ISPG Ad Hoc Committee on Space Allocation.

Member, Computer Service Committee.

Member University Research Park Committee.

ADMINISTRATIVE SUBDIVISION

K.M. Cameron

The objectives of the Administrative Subdivision are directed toward providing efficient and timely administrative services to the Institute. This support includes the maintenance of the building, laboratory instrument repair and development plus the general housekeeping of the building and grounds.

The Subdivision is manned by a staff of 22. During the fiscal year 1982-83, the following staff changes occurred:

Resignations:

Ms. E. Ijeh resigned from Word Processing on April 6, 1982.
Mr. M.J. Hall resigned his position as Senior Storesman on April 30, 1982.
Ms. S. Wilson resigned from Accounts on January 31, 1983.

Promotions:

Mrs. M. Brown was promoted from an OCE-02 to a SCY-02 on June 28, 1982.

Appointments:

Mr. B.F. Davies was appointed to the ISPG Supply Section on April 19, 1982.
Mr. W.J. Williams was appointed to the ISPG Supply Section on July 12, 1982.
Mrs. D.A. Beauregard was appointed to the Word Processing Centre on September 7, 1982.
Mr. D.Y.H. Li was appointed to the Accounts and Finance Office on January 31, 1983.
Mrs. A.Y. Seif was appointed to the Word Processing Centre on June 10, 1982.

Attendance at Meetings, Conferences and Courses

K.M. Cameron

Staffing Course for Line Managers, Ottawa, June 22-24, 1982.

Performance Review and Employee Appraisal Training Course, Calgary, March 29-30, 1982.

H. King

NBI Word Processor Training, Calgary, February 14-18, 1983.

D. Beauregard

NBI Word Processor Training, Calgary, April 4-8, 1983.

A. Seif

NBI Word Processor Training, Calgary, April 4-8, 1983.

REGIONAL GEOLOGY SUBDIVISION

D.G. Cook

The objectives of the Regional Geology Subdivision are directed toward the increased understanding of the depositional and deformational history of Proterozoic and Phanerozoic sedimentary rocks of Western and Arctic Canada. The investigations provide the data base essential for the appraisal of the potentialities of these sedimentary suites, both as reservoirs for, and sources of oil and gas, and as host rocks for other economic deposits including coal, potash, lead, zinc and copper.

The Regional Geology Subdivision is organized along geographic lines, partly in response to similar geological problems and partly because of similar logistical problems. It comprises three sections. The Arctic Islands Section is responsible for the sedimentary areas of the Arctic Islands with geological investigations being concerned mainly with Proterozoic and Phanerozoic rocks of the Franklinian Geosyncline, Stable Platform, and Sverdrup Basin. The Southern Mainland Section is concerned with sedimentary regions of the Yukon and Mainland Northwest Territories, including the Mackenzie Delta and Beaufort Sea. The Northern Mainland Section is responsible for sedimentary rocks lying within the prairie provinces and eastern British Columbia.

The Institute is the repository for cutting samples, cores, and other data resulting from both onshore and offshore exploration drilling by industry in Yukon Territory, Northwest Territories, including the Arctic islands and for samples from all provinces and continental shelves of Western Canada. Some twelve (12) million samples and 25,000 boxes of core are stored at the Institute; the number of samples increases by about 300,000 each year. With the exception of samples from wells in Alberta, all are available to the public for free examination. Files are maintained of all the logs and other data related to more than 70,000 wells drilled in Western and Arctic Canada.

Highlights

The last major phase of field work in a program to complete the geological reconnaissance of nine map-areas in northern Ellesmere Island was carried out with the help of guests from the Greenland Survey and Canadian and British universities. The lower Paleozoic stratigraphic-structural framework has been consolidated and refined. Two major provinces, a sedimentary trough and a magmatic belt are divided into three subprovinces each, that permit interpretation of profound across-strike changes in stratigraphy in terms of facies change, strike slip and accretion of alien terranes. The major stratigraphic units of the trough can all be correlated with units in northern Greenland. A trilobite find demonstrates that two thick formations of the Franklinian miogeocline, previously regarded as late Proterozoic in age, in fact are Early Cambrian.

Permian redbeds in the Markham Fiord - M'Clintock inlet area can now be correlated with marine rocks farther south. Telescoping of Pennsylvanian facies in the Clements Markham Inlet area indicates substantial shortening along Eurekan thrusts.

A detailed study of the Lake Hazen zone of thrust faults suggests that the zone comprises transpressional upthrusts related to less than 12 km of dextral motion.

Field studies in the northern Richardson Mountains and subsurface studies in the Mackenzie Delta, of Neocomian strata, has helped define an east-to-west change from terrestrial to shoreline to shelf sediments. Subsurface studies, combined with reflection seismic data, have defined stratigraphic sequences and their contained depositional facies and these studies have provided the basis for an initial assessment of the basin's petroleum potential.

Lower Paleozoic stratigraphic studies in the Richardson mountains revealed that most basin facies units are comparable to new stratigraphic divisions of the Selwyn Basin and Kechika Trough. They were also found to be zinc rich.

A cooperative University of Calgary - GSC study has resulted in submission to the Canadian Journal of Earth Sciences of the first ever proposal for constructing a $\delta\ ^{34}S$ and $\delta\ ^{18}O$ composition age curve for sedimentary barites.

A Devonian subsurface report documents Lower, Middle & Upper Devonian stratigraphy and sedimentology of the Great Slave and southern Great Bear Plains. The Middle-Upper Devonian boundary has been more precisely defined on the basis of conodonts.

Manetoe Dolomite in the gas-bearing carbonates of the southern Mackenzie Mountains was found to have replaced parts of the Arnica, Landry and Nahanni Formations instead of being a depositional unit in its own right.

Isotopic evidence suggests that the lead contained in mineralized parts of the Lower Paleozoic carbonate sequence of the northern Cordillera was probably derived from the adjacent shales during Late Paleozoic or Mesozoic time.

The Devonian succession in the Rocky Mountains between 53°00'N and 55°30'N consists of four unconformity-bounded sequences of Emsian, Givetian, Frasnian and Famennian age. Basal sediments of the first three sequences are in part nonmarine sands which were dispersed to the east and south during Givetian and Frasnian respectively. This suggests a landmass to the west and northwest which, for the Middle and Late Devonian, have previously been interpreted to be directions of deepening marine environments.

The northward change in Rocky Mountain Foothills structural style from thrust to fold dominant near 54°N is attributed to the northward development of major zones of detachment in both Upper Devonian and Jurassic-Lower Cretaceous strata.

Late Cretaceous-Early Tertiary deformation controlled the depth and time of burial and therefore the thermal maturation of Lower and Upper Cretaceous coals within the Foothills and Inner Plains near 54°N. The low rank (high volatile A bituminous) of Lower Cretaceous coals exposed in the western part of the Foothills suggests that these strata were never buried under a major thrust sheet. This is consistent with the observed multiple zones of detachment that prevent the development of a fault with large stratigraphic separation.

Personnel Notes

The subdivision presently consists of a permanent roster of 20 scientists, 2 technicians and 2 support staff.

A.V. Okulitch resigned his position as Research Scientist in the subdivision in order to accept a position in the Director General's office. He is still based in Calgary at ISPG.

G.C. Taylor was promoted to a PC5 effective January 1983 when he accepted a position as Senior Petroleum Geologist in the Petroleum Resource Assessment Secretariat.

The Curation Section comprising M.A. Halkett and G.E. Smith was transferred from Regional Geology to Paleontology Subdivision.

P.W. Yeabsley resigned his position as Storesman in the Core and Sample Repository in January 1983. D.J. Copithorne was appointed to this position in February 1983.

B.C. Richards accepted permanent employment as a Research Scientist in December 1982.

D. Stewart, a term employee, successfully completed a project to compile maps of Somerset Island and Boothia Peninsula in March 1983. He has accepted employment with the Government of New Guinea.

Attendance at Meetings, Conferences and Courses

J.D. Aitken

Conference to complete writing of the North American Code of Stratigraphic Nomenclature, Carmel, California, March, 1982

Conference of the DNAG volume "Sedimentary Cover of the North American Craton - USA", Norman, Oklahoma, April 1982

GAC/MAC Annual Meeting, Winnipeg, May, 1982

AAPG/SEPM Annual Meeting, Calgary, June 26 - July 1, 1982

Fourth International Williston Basin Symposium, Regina, October, 1982

I. Banerjee

AAPG/SEPM, Annual Meeting, Calgary, June 26 - July 1, 1982

International Association of Sedimentologists, Hamilton, August, 1982

M.P. Cecile

DINA Geoscience Forum, Whitehorse, December 1982

R.L. Christie

AAPG/SEPM Annual Meeting, Calgary, June 26 - July 1, 1982

IGCP Project 156: 5th International Workshop and Seminar on Phosphorites, Kunming, China, November, 1982

D.G. Cook

GAC/MAC Annual Meeting, Winnipeg, May, 1982

AAPG/SEPM Annual Meeting, Calgary, June 26 - July 1, 1982

Penrose Conference on Laramide Tectonics of the Rocky Mountain Foreland, Red Lodge, Montana, August, 1982

A.F. Embry

G.S.A. Annual Meeting, New Orleans, October, 1982

U. Mayr

International Symposium on the Ordovician System, Oslo, Norway, August 1982

N.C. Meijer-Drees

International Association of Sedimentologists, Hamilton, August 1982

L.L. Price

GAC/MAC Annual Meeting, Winnipeg, May, 1982

D.F. Stott

AAPG/SEPM Annual Meeting, Calgary, June 26 - July 1, 1982

Fourth International Williston Basin Symposium, Regina, October, 1982

R. Thorsteinsson

GAC/MAC Annual Meeting, Winnipeg, May, 1982

Special Talks or Lectures

I. Banerjee

" Structural Analysis of Cross-bedded Sequences", International Sedimentology Conference, Hamilton, Ontario, August 22-27.

R.L. Christie

"Phosphorite in Canada and the Canadian Phosphate Industry", AAPG/SEPM Annual Meeting, Calgary, June.

"The phosphate industry in Canada and Canadian occurrences of Precambrian phosphorite", IGCP Project 156, Phosphorites, Guizhou province, China, December.

"High Arctic Geology, 1950's", AINA, Calgary, December 8.

H. Geldsetzer

"Devonian Succession Southwest of the Peace River Arch", McConnel Club Meeting, ISPG, Calgary, January 14,

"Devonian Unconformities Southwest of the Peace River Arch", 8th Annual Workshop on the Tectonics of the Southern Canadian Cordillera, Calgary, February 5.

"Devonian unconformity - bounded sequences in east-

central British Columbia", CSPG Sedimentology Conference in honour of Dr. Helen R. Belyea, Calgary, March 18.

U. Mayr

"Peritidal & subtidal carbonate formations Cambrian-Ordovician Canadian Arctic Islands", IV International Symposium on the Ordovician System, Oslo, Norway, 20-23 August.

"Canadian Arctic Islands to Canada Basin: Transect G", and "The Continental Margin of North America in the Canada Basin of the Arctic Ocean, New Orleans, Louisiana, 95th Annual Meeting of Geological Society of America, October 18-21.

N.C. Meijer-Drees

"Sedimentary & Replacement Structures in the Devonian Prairie Evaporite Formation", IAS, Hamilton, Ontario, August 22-27, and CSPG - Sedimentology Division, Calgary, November 10.

"Depositional history of the Elk Point Group", Major Controls on Devonian Stratigraphy and Sedimentation Conference, Calgary, March 18-19.

Membership on Committees

J.D. Aitken

Corresponding Member, Precambrian-Cambrian Boundary Working Group, International Union of Geological Sciences

Member, Canadian Working Group on Precambrian Stratigraphy

Co-editor, Sedimentary Cover of the North American Craton - Canada (D-NAG; Geology and Economic Minerals of Canada, 6th Edition)

Member, ISPG Committee on Guided Tours

M.P. Cecile

Associate Editor, Geoscience Canada

Chairman, CSPG International Liaison Committee

Member, CSPG Continuing Education Committee

Member, CSPG National Conference on Earth Science, Advisory Committee

Chairman, CSPG Logan Day Committee

Member, ISPG Tour Committee

Director, Canadian Society of Petroleum Geologists Executive Committee

Member, ISPG Exhibits Committee

Member, ISPG Ad Hoc Committee on Open House

R.L. Christie

Canadian Corresponding Member, Project 156 of International Geological Correlation program (phosphorites)

Canadian Representative (alternate), Working Group III, Young Phosphogenic Systems

Vice-Chairman, Phosphate Research Group, Society of Economic Paleontologists and Mineralogists

D.G. Cook

Co-Chairman, Canadian Society of Petroleum Geologists Structural and Tectonic Terms Lexicon Committee

ISPG Liaison Officer to Alberta Geological Survey

Member, ISPG Computer Management Committee

Member, Canadian Society of Petroleum Geologists, International Liaison Committee

J.D. Dixon

Editor, Bulletin of Canadian Petroleum Geology (January 1982)

Organizer of Short Courses, 1983 Canadian Society of Petroleum Geologists Convention

Member, ISPG Stratigraphic Nomenclature Commmittee

Member, CSPG Program Committee, SEPM 1982 Annual Meeting

A.F. Embry

Chairman, ISPG Stratigraphic Nomenclature Committee

Member, North American Commission on Stratigraphic Nomenclature

Editor, 3rd Arctic Symposium Procedures

CSPG Memoir 8, Arctic Geology and Geophysics

Technical Committee, CSPG Mesozoic Conference, Member

U. Mayr

Member, North American Continent-Ocean Transect Program

M.E. McMechan

Chairman, Structural Geology Division, CSPG

Secretary-Treasurer, Structural Geology Division, GAC

Member, CSPG National Conference on Earth Science, Advisory Committee

Member, CSPG, Medal of Merit Committee

Member, ISPG Library Committee

D.W. Morrow

Secretary, CSPG Executive

N.C. Meijer-Drees

N.C. Meijer-Drees

Co-chairman, CSPG Sedimentology Division

E.G. Snow

Member, CSPG Lexicon of Tectonic Terms Committee

D.F. Stott

Chairman, 1983 CSPG Mesozoic Conference

Editor, CSPG Memoir, "Mesozoic of Middle North America"

Co-editor, Sedimentary Cover of the North American Craton - Canada (D-NAG; Geology and Economic Minerals of Canada, 6th Edition)

R. Thorsteinsson

Chairman, Royal Society of Canada, Miller Medal Committee

H.P. Trettin

Leader, Innuitian Volume "Decade of North American Geology", Geological Society of America - Geological Survey of Canada

Lapidary

Thin sections, standard	1,362

Core and Sample Repository

Well Samples received:

Alberta	230,250
British Columbia	25,735
Saskatchewan	19,800
Manitoba	Nil
Northwest Territories	12,600
	288,785

Mechanical logs received:

Alberta	15,852
British Columbia	683
Saskatchewan	2,001
Manitoba	409
Northwest Territories	115
	19,060

Territories Core Received: 711 boxes

Visitors requiring core, samples, or related information	2,323

There was a total of 6,595 boxes of core made available for examination and samples from some 1,073 wells were requested.

Approximately 12 million well samples and 25,000 boxes of core on active file and available for examination.

Cuttings or core from about 40 wells were sampled for various scientific purposes by 10 to 15 oil companies (estimate only).

PALEONTOLOGY SUBDIVISION

E.W. Bamber

The Paleontology Subdivision is responsible for interpretation of the fossil record in Canada through studies in biostratigraphy, paleoecology and systematic paleontology. These investigations provide data that support regional mapping and stratigraphic studies, and exploration for hydrocarbons, metals and other non-renewable resources. Most of the Subdivision's activities are in northern and western Canada, but a significant number of projects deal with onshore basinal areas in eastern Canada. In all these areas, paleontology plays an important role in GSC basin analysis programs for evaluation of energy reserves.

The Subdivision develops and maintains biostratigraphic standards for regional and international correlation and carries out a continuing program for improvement of zonal schemes and more effective interpretation of paleo-environments. Most projects are directed toward well-known fossil groups that display rapid evolutionary changes and are therefore particularly useful for biostratigraphy, but relatively poorly known fossil groups are also being tested for biostratigraphic potential and application. A large part of the program involves dating and correlation by means of detailed studies of fossils recovered from cuttings and cores from northern and offshore wells.

The subdivision comprises the Micropaleontology Section, the Macropaleontology Section, the Ottawa Paleontology Section (including both Micropaleontology and Macropaleontology), and the ISPG Curation unit. Micropaleontological studies, mainly on palynomorphs, foraminifers, conodonts, and ostracodes, involve material from both surface and subsurface with emphasis on subsurface well material from frontier and offshore areas. Macropaleontological studies, on a wide variety of groups, deal mainly with surface material, but include some material from subsurface cores. In addition to paleontological studies, members of the subdivision conduct stratigraphic studies in cooperation with other units of the Geological Survey of Canada. The Curation unit is responsible for receipt, documentation, cataloguing, storage, retrieval and loans of GSC field and subsurface samples from the Calgary and Vancouver offices.

Research and service programs within the Subdivision are closely coordinated with those of other subdivisions of the ISPG, with similar programs in other divisions of GSC, and with programs of outside government agencies, universities, and industry in Canada and other countries. The function of the subdivision is conducted, in part, through contracts with consulting companies and university scientists, supervised by scientists within the subdivision. In addition, a number of EMR Research Agreements, arranged with scientists outside the Survey, are administered by the subdivision.

Highlights

Subdivision scientists and associated outside experts completed 117 paleontological reports on 1,662 lots of fossils from outcrop and subsurface. These reports were prepared for direct quotation in publications and provided dating and correlation of rock units throughout Canada for use by the GSC and other EMR agencies, industry, and Provincial Government agencies, such as the Alberta Geological Survey and the Manitoba Department of Energy and Mines.

A major study was completed on the Jurassic-Cretaceous foraminiferal succession in the eastern Arctic Islands. Eleven microfaunal assemblages were recognized, and the resulting zonal scheme was successfully applied to the correlation of rock units in the surface and subsurface of the area. The biostratigraphic framework thus established provides a basis for the dating and interpretation of equivalent petroliferous sediments in the central part of the Sverdrup Basin.

The Cenozoic foraminiferal zonation established in the Dome Gulf et al Kopanoar M-13 well has been extended to several other Beaufort Sea wells, thus establishing a biostratigraphic framework through deep-water and outer-shelf facies and providing an integral component of the geological data for a comprehensive analysis of the Beaufort-Mackenzie sedimentary basin.

Jointly with the Cordilleran Division, a detailed biostratigraphic study was completed of the XY lead-zinc deposit at Howards Pass, Yukon Territory and District of Mackenzie. The mineralization is thought to be stratigraphically controlled and its dating will aid in exploration for similar deposits in northern British Columbia and the Yukon Territory.

Scientists of the subdivision made important contributions as organizers and members of working groups within the I.U.G.S. Stratigraphic Commission. Major progress was made toward the establishment of several Stage and System boundaries, including an international agreement on the position of the Middle-Upper Devonian boundary.

An important synthesis was completed, summarizing Lower Carboniferous palynostratigraphy of eastern and western Canada and comparing the succession of Canadian miospore assemblages with that of western Europe.

A summary paper outlining the stratigraphic distribution of Lower Silurian conodonts in eastern Canada was completed and a series of 1:2 000 000 maps was compiled showing variations in conodont colour alteration indices for use in determining the thermal history of Cambrian, Ordovician, and Silurian strata of St. Lawrence Lowlands and the Appalachians.

Personnel Notes

The subdivision includes 32 permanent positions (19 scientists, 9 technicians, 2 secretaries, 2 curators) and a number of temporary assistants, but is presently below strength by four positions. During the year C. Bolton and G. Buckler joined the Ottawa Paleontology Section and B. Hriskevich and D. Boyce joined the staff in Calgary. E. Erdmer has been on leave from the Ottawa Paleontology Section since early September and M. Camfield was with the section as a term employee until September 30th. R. Quarry retired in September, 1982, after four years as secretary for Paleontology and Regional Geology in Calgary. The Curation unit, including M. Halkett and G. Smith, was transferred to the subdivision from Regional Geology in early 1983.

Attendance at Meetings, Conferences and Courses

Third North American Paleontological Convention, Montreal, August 4 - 7.

M.J. Copeland
A.E.H. Pedder
E.W. Bamber
T.P. Poulton
E.T. Tozer

Annual Meeting of American Association of Petroleum Geologists, Calgary, June 28 - 30.

T.T. Uyeno
J.H. Wall
A.R. Sweet
D.J. McIntyre
D.H. McNeil

American Association of Stratigraphic Palynologists (AASP) and Commission Internationale de Microflore du Paleozoique (CIMP), combined annual meeting, Dublin, Ireland, September.

D.C. McGregor
J. Utting

Eighth International Ostracode Congress, Houston, Texas, July 24 - 30.

M.J. Copeland

IUGS Subcommission on Devonian Stratigraphy, field conference and meeting in Belgium and West Germany, August 12-25.

D.C. McGregor
A.W. Norris

Geological Association of Canada Annual Meeting, Winnipeg, May 17 - 19.

G.S. Nowlan

Fourth International Symposium on the Ordovician System, Oslo, Norway, August 20 - 23.

G.S. Nowlan
B.S. Norford

Third European Conodont Symposium (ECOS III), Lund, Sweden, August 30 - September 1.

G.S. Nowlan

Meeting of IUGS Subcommission on Jurassic Stratigraphy, Calgary, August.

T.P. Poulton

IGCP Circum-Pacific Jurassic Working Group Meeting, Calgary, August.

T.P. Poulton

Canadian Paleontology and Biostratigraphy Seminar, Calgary, September 18.

B.S. Norford
E.W. Bamber
J.H. Wall

Current Activities Forum, G.S.C., Ottawa, January 19 - 20.

B.S. Norford

Membership on Committees

E.W. Bamber

North American Study Group, International Subcommission on Permian Stratigraphy, Member.

Middle Pennsylvanian Working Group, Dinantian Working Group, International Subcommission on Carboniferous Stratigraphy, Member.

M.J. Copeland

International Union of Geological Sciences, Subcommittee on Silurian Stratigraphy, Corresponding Member.

International Research Group on Paleozoic Ostracods, International Paleontological Association, President.

North American Paleoentological Convention III, Committee Member and Editorial Committee.

Geological Survey of Canada, Education Committee, Chairman.

Geological Survey of Canada, Library Committee, Member.

National Inventory Programme, Paleontology data base, National Museums of Canada, Member.

Cultural Property Export and Import Act, Department of Communications, Expert Examiner, Paleontology.

W.H. Fritz

Precambrian-Cambrian Boundary Working Group, International Union of Geological Sciences, International Geological Correlation Program, Member.

D.C. McGregor

IUGS Subcommission on Devonian Stratigraphy, Voting Member.

IUGS Working Group on the Devonian-Carboniferous Boundary, Corresponding Member.
Biostratigraphic Subcommittee of American Commission on Stratigraphic Nomenclature, member.

International Commission for Palynology, Vice president, Member of Hystricospore Working Group.

Commission internationale de Microflore du Paleozoique, member of executive committee.

American Association of Stratigraphic Palynologists, representative to International Commission for Palynology, member of committee for revision of by-laws.

D.H. McNeil

Canadian Paleontological Monograph Series (GAC-CSPG), Associate Editor.

ISPG Committee on Open House, Member.
ISPG Exhibits Committee, Member.

B.S. Norford

Working Group on Cambrian-Ordovician Boundary, International Commission on Stratigraphy, Chairman.

Working Group on Ordovician-Silurian Boundary, International Commission on Stratigraphy, Corresponding Member.

Paleontographica Canadiana, Associate Editor.

Board of Directors Canadian Energy Research Institute, Member.

Chancellor, University of Calgary.

Canadian Geoscience Council Visiting Committee to the Geological Survey of Canada, Liaison officer.

Energy, Mines and Resources, Committee for Evaluation of Earth Sciences Services Program, Geological Survey of Canada, Member.

A.W. Norris

Subcommission on Devonian Stratigraphy, International Union of Geological Sciences, Voting Member.

North American Devonian Study Group, Organizing member.

G.S. Nowlan

Secretary of the Joint Committee on Paleontological Monographs representing GAC.

IUGS Subcommission on Silurian Stratigraphy, Corresponding Member.

IUGS Ordovician-Silurian Boundary Working Group, Corresponding Member.

IGCP Project 27, Appalachian - Caledonian Project, Corresponding Member.

Editorial Committee, Geological Association of Canada, Member (Editor, GEOLOG).

Advisory Committee for Ms. I. Munro, Ph.D. candidate, Ottawa University.

A.E.H. Pedder

International Association for the Study of Fossil Cnidaria, Council Member.

Subcommission on Devonian Stratigraphy, International Union of Geological Sciences, Corresponding Member.

North American Devonian Study Group, Member.

T.P. Poulton

ISPG Nomenclature Committee, Member.
ISPG Chairman of McConnell Club.

A.R. Sweet

Advisory Committee on Paleontological Resources, Province of Alberta, Department of Culture, Member.

Drumheller Paleontology Museum and Research Institute Advisory Committee, Member.

E.T. Tozer

IUGS Subcommission on Triassic Stratigraphy, Vice Chairman.

IUGS Commission on Stratigraphy, Working group on Permian-Triassic Boundary, Chairman.

J. Utting

International Commission for Palynology, Councillor representing Canadian Association of Palynologists.

Canadian Society of Petroleum Geologists, Paleontology Group, Chairman.

IUGS Working Group on the Permian-Triassic boundary, member.

T.T. Uyeno

North American Working Group on the Devonian System, Member.

J.H. Wall

ISPG Library Committee, Chairman

Journal of Foraminiferal Research, Associate Editor.

Alberta Paleontological Advisory Committee, alternate representative from GSC.

International Working Group on the Jurassic-Cretaceous boundary, correspondent member.

Member, University of Calgary Sigma Xi Chapter, Admissions Committee.

D.J. McIntyre

American Association of Stratigraphic Palynologists, Director.

M. Halkett

Chairman, ISPG Support Staff Annual Field Trip Committee.

Chairman, ISPG Tour Committee.

Member, ISPG Safety Committee.

Special Talks & Lectures

A.E.H. Pedder

"Devonian coral faunas of the Canadian Arctic", Silurian-Devonian Paleontology of Arctic North America Symposium, Third North American Paleontological Convention, Montreal, August 7.

J. Utting

A review of the Lower Carboniferous miospore succession in Canada and a comparison with Western Europe; American Association of Stratigraphic Palynologists, Dublin, September.

E.T. Tozer

Marine Triassic Faunas of North America: Their significance for assessing Plate and Terrane Movement, Symposium on Triassic, at the meeting of the Geologische Vereinigung, Wurzburg, Germany, February.

M.J. Copeland

Paleocopid Ostracoda and the Ordovician-Silurian boundary in Canada, Eighth International Ostracode Congress, Houston, Texas, July 26.

G.S. Nowlan

Paleogeographic, biostratigraphic and tectonic implications of Late Ordovician conodonts in the Appalachians of eastern Canada, IVth International Symposium on the Ordovician, Oslo, Norway, August 23.

Early Silurian conodonts of eastern Canada, Third European Conodont Symposium (ECOS III), Lund, Sweden, August 31.

D.C. McGregor

Biogeography of Upper Devonian spores: AASP/CIMP annual meeting, Dublin, Ireland, September.

B.S. Norford

Review of potential stratotype sections for the Cambrian-Ordovician Boundary in Canada; International Symposium on Ordovician System, Oslo, Norway, August 23, and Canadian Paleontology and Biostratigraphy Seminar, Calgary, September 18, 1982, Department of Geological Sciences, University of Saskatchewan, Saskatoon, November 26.

Review of ISPG's program in northern and western Canada, GSC Current Activities forum, Ottawa, January 19.

D.H. McNeil

Foraminiferal Biostratigraphy of the Dome Gulf et al. Kopanoar M-13 well, Beaufort Sea, Paleontology Subdivision of the Canadian Society of Petroleum Geologists, Calgary, February 28.

Laboratory Statistics - Calgary

Foraminifer Laboratory

The laboratory processed 922 samples from outcrop and well material. Of these 891 were for scientific projects led by D.H. McNeil and J.H. Wall and the remainder were for projects led by other scientists.

Conodont Laboratory

A total of 546 samples were processed and picked, and conodonts from 10 other samples were picked under the microscope; all processed material for projects led by T.T. Uyeno.

Palynology Laboratory

The laboratory processed 1,232 surface and subsurface samples. Of these 1,148 were for projects led by D.J. McIntyre, A.R. Sweet and J. Utting, and 48 were for service projects outside ISPG. The laboratory assumed responsibility for curation of type palynological specimens in temporary storage at ISPG.

Macropaleontology Laboratory

The prime output consisted of 1,996 coral and foraminiferal thin-sections for study by A.E.H. Pedder, E.W. Bamber and B.S. Norford and paleontologists outside ISPG. Fossils were picked and sorted from 5 acid residues and 21 replicas were made by moulding and casting techniques.

Curation Statistics - Calgary

"C" Numbers Issued	10,000
New Collections (surface)	9,995
New Collections (subsurface)	3,000
Transferred from Ottawa	1,000

Fossils, rocks, and thin sections were loaned to, donated to, or processed for: 8 Canadian universities, 4 foreign universities, 1 museum, 4 oil companies, 5 Canadian government agencies (includes Cordilleran and AGC), and 1 foreign Government. Total 24 agencies.

Ottawa Laboratories

Lapidary Laboratory

Rock thin sections	
Standard, produced by laboratory	4,010
Oriented	75
Large	100
Polished, purchased by contract	1,295
Polished, produced by laboratory	10
Covered only	15
Polished rock surfaces	160
Rock trim cuts	5,425
Levelled rock surfaces and saw cuts	3,890

Paleontology Laboratory

Preparation	
Thin sections	141
Plaster Casts	131
Rubber Moulds	10
Silicone Rubber Moulds	62
Epoxy Casts	124
Conglomerate Plaques	11
Other Preservation Plaques	14

Type specimens catalogued in 1982 (Thomas E. Bolton, Curator)

Publications	PC.	Camb.	Ord.	Sil.	Dev.	Carb. Perm.	Jur.	Cret.	Tert.	Total	Nfld.	N.B.	Que.	Ont.	Manit.	Alt.	B.C.	Yuk.	NWT
GSC Memoir																			
392 (Conodonts)					155					155					X				
GSC Bulletins																			
283 (Microfossils)							205			205						X	X		
326 (Brachiopods)					481					481									X
332 (Condonts)					125					125				X					
334 (Brachiopods, Conodonts)					87					87						X			
339 (Stromatoporoids)					428					428				X					
343 (Acritarchs)		50	41							91	X								
348 (Miospores)					219					219									X
352 (Corals)				20	15					35			X	X				X	
GSC Papers																			
80-32 (Forams)									73	73									X
81-10 (Pseudofossils)	2									2				X					
82-1A (Ammonite)							1			1							X		
82-1B (Ostracodes)				3						3			X						
82-1C (Corals, Ammonite, Trilobites)		90	9		12		1			112	X						X	X	X
Subtotals (GSC)	2	140	50	23	1522	-	207	-	73	2017									
Can. J. Earth Sci. (Corals, Brachiopods, Acritarchs, Algae, Graptolites, Trilobites, Conodonts)			125	64	26	28	19			262	X		X	X			X	X	X
J. Pal. (Trilobites, Brachiopods, Gastropods)		4		16	53					73				X			X		X
Other (Trilobites, Palynomorphs, Plants, Conodonts, Trace)	13		70	10				78	5	176	X	X							X
Subtotal (Outside)	13	4	195	90	79	28	19	78	5	511									
Total	15	144	245	113	1601	28	226	78	78	2528									

Curation

Parcels received	79
Parcels shipped	121
Locality numbers issued	690
Fossils lots received with Calgary numbers	146

Palynology Laboratory

Samples processed	74
Slides prepared	151

Conodont Laboratory

Samples acidized	387
Samples picked on contract (conodonts & ostracodes)	478

PETROLEUM GEOLOGY SUBDIVISION

T.G. Powell

The Petroleum Geology Subdivision is responsible for compiling and interpreting the geological information necessary for the evaluation of oil and natural gas for the sedimentary basins of Arctic and Western Canada. Research is also conducted into the mode of origin and occurrence of these commodities to provide necessary background for the evaluation studies. The Subdivision activities in resource evaluation are interrelated with other programs of the Division and are coordinated with the work of other agencies within the Federal Department. Responsibility for these programs is divided among three sections.

The Petroleum Resources Section is primarily responsible for the geological and geophysical studies required to determine petroleum plays and parametric data required for resource assessment and the maintenance of computer data files related to well data, oil and gas pool data and other information. Much of the work of the Section is coordinated through the Petroleum Resource Assessment Secretariat with related activities within the Institute's programs and with the Canadian Oil and Gas Lands Administration.

The Geochemistry Section provides scientific services to the Division, develops and publishes analytical techniques in X-ray diffractometry, X-ray fluorescence and analytical chemistry, and carries out research in the field of diagenesis related to the oil-generating potential of source rocks and formation of authigenic minerals in sandstone reservoirs. Crude oil studies are also undertaken to determine oil-source relationships and to document geochemical changes in crude oil composition that occur in the reservoir. Most of these studies are carried out on material from the Arctic Islands, Mackenzie Delta region and the East Coast Offshore and provide data for the Petroleum Resource evaluation program.

The Data Management Section provides computer services to the Division.

Highlights

Basin analysis teams in the Sverdrup and Beaufort-Mackenzie Basin continue to work effectively. In the Sverdrup Basin team members completed an analysis of the geology, geophysics and geochemistry of the Heiberg Group and Awingak Formations which led to development of play concepts, derivation of play parameters and resource assessment for these units. Similar studies have been undertaken in the offshore Beaufort area and will lead to an updated assessment in the next few months.

Several major capital acquisitions were made in geochemistry from OERD supported projects. These include a computerized capillary gas chromatograph mass spectrometer, equipment for pyrolysis gas chromatography, Rock-Eval pyrolysis unit and microprocessor controllers. Data capture devices were added to X-ray fluorescence CHN elemental and SEM energy dispersive X-ray analyzers.

A geological and geochemical evaluation of the Kunga Formation, Queen Charlotte Islands, as a potential oil shale deposit has been undertaken in conjunction with the B.C. Department of Mines. Similar studies are in progress in respect of the Kettle Point Formation and Collingwood Member of the Whitby Formation of southwestern Ontario in conjunction with the Ontario Geological Survey and of the Second White Speckled shale from Manitoba and Saskatchewan.

Participation in the inter-laboratory project "Alaska North Slope Oil-Source Correlation Study" sponsored by the USGS and AAPG gave an appreciation for oil-source relationships on the Alaskan North Slope and information which will be useful for the evaluation of the W. Beaufort area.

Organic geochemical studies of Lower Paleozoic oils and rocks in southwestern Ontario in conjunction with University of Waterloo have resulted in the identification of three oil families and their potential sources.

The source for the Hibernia oil has been identified and confirmed utilizing oil-source correlation techniques.

Controls on authigenic clay formation in the deeply buried Viking Formation in the Joffre and Caroline regions of Alberta have been delineated, and confirmed the model erected in a previous study.

Techniques for correction of target-tube contamination and inter-element interferences and for selection of target tubes for XRF work have been developed.

Comparisons have been made between different methods (X-ray fluorescence, wet chemistry - atomic absorption analysis and neutron activation analysis) for analysis of major and minor elements in coal. The response of different coals to low temperature ashing has been studied.

Programming assistance, implementation and adoption of major programs have been undertaken by the Data Management Section.

Personnel Notes

The Petroleum Geology Subdivision employs a permanent staff of 16 scientists, 10 technicians, and 1 secretary. The following positions are vacant: Organic Geochemist (2), Inorganic Geochemist; SEM Technician; Petroleum Geologist (3 positions). A. Embry is on temporary assignment from Regional Geology Subdivision.

C. A. Churchill joined the organic geochemistry section.

M. W. Ferguson joined the organic geochemistry section.

M. Labonte joined as Head, Data Management Section.

D. W. Lepard joined as programmer.

N. J. McMillan joined as Head, Petroleum Resources Section.

G. P. Michael resigned as technician in the SEM lab.

K. G. Osadetz was promoted to petroleum geologist (W. Canada).

P. Singh resigned as technician in the organic lab.

D. N. Skibo transferred from Petroleum Resource Assessment Secretariat as geologist (W. Canada).

K. Tazaki completed her Post-Doctoral Fellowship.

Attendance at Meetings, Conferences and Courses

T. G. Powell

Annual Meeting, AAPG, Calgary, June 3-5, 1983.

Gordon Research Conference on Organic Geochemistry, Plymouth New Hampshire, August 22-27, 1982.

Workshop on Oil Source Correlation sponsored by USGS and AAPG at Yountville, California, February 21-25, 1983.

A.A. Densmore

C.S.E.G. Annual Meeting, Calgary, April 5-8, 1982.

Annual Meeting, AAPG, Calgary, June 3-5, 1982.

S.E.G. Annual Meeting, Dallas, October 18-22, 1982.

J. R. Dietrich

C.S.E.G. Annual Meeting, Calgary, April 5-8, 1982.

Course - Understanding Sandstone Depositional Systems, Calgary, April 19-20, 1982.

Course - The Seismic Explorationist, September 27 - October 1, 1982, Calgary.

M. O. Fuglem

AAPG Annual Meeting, Calgary, June 3-5, 1982.

B. L. Gorham

Course - HP TRANSACT/3000 Course, Calgary, August 30 - September 3, 1982.

W. S. Hopkins

Course - Applied Reservoir Engineering for Geologists, Calgary, June 7-11, 1982.

M. Labonte

Course - "Computer Graphics and Mapping - Trends and Updates", Edmonton, February 15, 1983.

HP3000 System Manager's Course, Calgary, January 17, 1983.

N. J. McNeill

Course - Geophysical Prospecting for Hydrocarbons, Calgary, April 15-23, 1982.

G. P. Michael

Course - Advanced Scientific Programming and FORTRAN Techniques, Calgary, November 17-18, 1982.

K. G. Osadetz

AAPG Annual Meeting, Calgary, June 3-5, 1982.

Course - Introduction to Seismic Interpretation, Calgary, March 14-18, 1983.

L. R. Snowdon

Annual Meeting of AAPG, Calgary, June 3-5, 1982.

Gordon Research Conference on Organic Geochemistry, Plymouth, N.H., August 22-27, 1982.

Workshop on Oil-Source Correlation sponsored by USGS and AAPG at Yountville, California, February 21-25, 1983.

K. Tazaki

GAC/MAC Meeting, Winnipeg, May 17-19, 1982.

K. E. Wallace-Dudley

AAPG Annual Meeting, Calgary, June 3-5, 1982.

Special Talks and Lectures

T. G. Powell

"Oil and Ore at Pine Point", CSPG Sedimentology Division Meeting, Calgary, December 1982, McConnell Club, ISPG, November 1982.

A. E. Foscolos

Graduate Course on "Soil Properties", University of Calgary.

L. R. Snowdon

"Organic Geochemical Properties of Alaska North Slope Crude Oils and Rocks"; Yountville, California, February 21-25, 1983.

Committee Membership

T. G. Powell

ISPG Computer Management Committee, Chairman.

Geological Potential Subcommittee, Member.

ISPG Open House Committee, Member.

M. Labonte

ISPG Computer Management Committee, Member.

N. J. McMillan

CSPG "Geology" Committee, Member.

CSPG Publications and Sales Committee, Member.

1983 CSPG Conference on Mesozoic of the Middle North America, Abstract Editor.

CSPG Banff Conference Committee, Advisor.

Geological Potential Subcommittee, Member.

L. R. Snowdon

ISPG Computer Management Committee, Member.

CSPG Bulletin, Associate Editor.

CSPG Geochemistry Division, Chairman.

Organic Geochemistry Laboratories

Analysis of light hydrocarbons and organic carbon:

	81/82	82/83
Light Hydrocarbon Analysis	316	0
Organic Carbon Analysis	1,142	3,690
Total Carbon	144	56

Extraction and Separation of hydrocarbon fractions:

	81/82	82/83
Extractions	91	188
Distillations	45	43
Separations	117	231
Gas Chromatographic Analysis	162	250

Kerogen Studies:

	81/82	82/83
Isolation	80	140
CHN Elemental Analysis	45	330

Source Oil Correlation Studies:

	81/82	82/83
Gasoline Range	389	380
Mass Spectrometry (Faman)	106	145
Capillary GC/MS Analysis	---	25
Pyrolysis Gas Chromatography	---	20

Rock-Eval Analysis:

	81/82	82/83
Whole Rock Analysis	---	1560

SEM Lab Statistics

	81/82	82/83
Exposures:		
Paleontology Subdivision	1,232	306
Petroleum	1,450	1,003
Regional	307	269
Coal	82	190
Others (Machine Shop, NEB, etc.)	94	255

Inorganic Geochemistry

	81/82	82/83
XRD Mineral Determinations	5,294	6,541
XRF Analysis	18,911	30,285
Infra-red Analysis	---	12
TGA/DTA	67	385
Atomic Absorption Analysis	2,124	181
Low Temperature Ash	88	33
High Temperature Ash	166	32
Miscellaneous (C, P, S, Moisture, pH)	568	230

COAL GEOLOGY SUBDIVISION

D.K. Norris

The role of the Coal Geology Subdivision continues to be that of establishing a sound geoscience base in the coal measures throughout Canada and of providing and maintaining a resource evaluation of Canadian coal deposits in collaboration with the Provinces, with industry and with the Atlantic Geoscience Centre. These activities are designed to meet policy, regulatory and information requirements of the Department of Energy, Mines and Resources.

To fulfil this role, the Subdivision is organized into three sections. The Geology of Coal Section conducts stratigraphic and structural studies of Canadian coal deposits that assist in the establishment of a geoscience data base from which resource evaluations can be made. Because of the increased importance of the domestic and foreign use of coal for the generation of electrical power, a new thrust of the section is in the direction of the geology of low rank coal deposits in western and northern mainland Canada, and of the bituminous coals of Nova Scotia and New Brunswick. The Coal Technology Section is engaged mainly in studies of the petrographic character of coal seams and their application to seam identification, correlation and quality prediction. In addition, the section is studying the trace element content of coal and the maturation of coal and organic matter in fine-grained clastic rocks. The Resource Evaluation Section is responsible for building and maintaining an inventory of exploration data relating to Canada's coal deposits. This inventory, which presently contains lithologic, coal thickness and analytical data for 8500 boreholes in Alberta, Saskatchewan and British Columbia is utilized by the Section for detailed computer-based assessments of the geology, resource quantity, mineability and quality of these coal deposits.

Highlights

Significant discoveries and advances in the geology and resource potential of Canada's coal deposits have been made during the past year, especially in the fields of coal petrology and computer processing. They are leading to improvements in interregional correlation, understanding of the physical history of the coal measures in some areas and in the predictive capacity of sedimentary models. Highlights of these discoveries and advancements are as follows:

1. Examination of coal samples from the Minnes, Bullhead and Fort St. John Groups of NE British Columbia and adjacent parts of Alberta showed a progressive increase in reflectance (rank) from east to west up to the position of the inner Foothills. West of there a decreases in rank is observed indicating that the westernmost coals were not buried as those to the east.

2. Reflectance studies of Kootenay coals from the west side of the Upper Elk Valley, B.C. indicate: a. ranks on the western side of the valley are significantly lower than ranks in comparable beds on the east side of the valley, b. reflectance changes are small and erratic across the stratigraphic section in the vertical beds on the west side suggesting significant post-Laramide coalification.

3. Petrological studies of the Hat Creek, B.C. coal deposits showed a cyclicity in compositional characteristics probably related to paleoenvironments. Two major cycles appear to be present each beginning with bright coal and ending with dull high mineral matter coal. This sequence suggests that progressively wetter conditions were present in the peat swamp toward the end of each cycle.

4. Investigation of optical properties such as dispersion and bireflectance on coal macerals and other carbonaceous materials such as graptolite and Chitinozoa remains show encouraging results relative to the use of such methods and materials in organic maturation studies.

5. Marine incursions in the Gething Formation are more common than formerly anticipated south of Pine River. A marine tongue has been identified in core and field sections with a lithofacies and microfauna similar to parts of the Moosebar Formation.

6. A computer-based study of lithologic and analytical data from 1350 coal exploration boreholes penetrating the lower Horseshoe Canyon Formation of Central Alberta reveals these strata accumulated in several depositional subenvironments within northeasterly-prograding, fluvially-dominated deltaic complexes. Each of these subenvironments has unique attributes in terms of geometry, lithologic composition and vertical and lateral lithologic interrelationships. Coal seam geometry is intimately associated with the lateral distribution of these subenvironments during deposition, and with compactional effects related to lithology distribution in underlying and overlying intervals subsequent to deposition.

7. A computer-based study of lithologic and analytical data from 750 boreholes penetrating the Ardley coal zone of the Scolland Formation of central Alberta suggest accumulation with entirely nonmarine, fluvial-alluvial plain depositional environments.

Personnel Notes

The Subdivision presently consists of a permanent staff of 11 scientists, 2 technicians and one secretary:

C.A. Boonstra	W.D. Kalkreuth
A.R. Cameron	K.E. Mottershead
M. Dawson	D.K. Norris
D.W. Gibson	K.C. Pratt
F. Goodarzi	B.D. Ricketts
J.D. Hughes	D.J. Smith
T. Jerzykiewicz	G. Smith

D.T. Blackburn from Australia spent 5 months in the Coal Technology Section as a post-doctoral fellow. His time was spent investigating various plant tissues mainly cuticles, isolated from low rank coals in western Canada.

A.R. Cameron was elected chairman of the Canadian Coal Petrologists Group.

F. Goodarzi joined the Subdivision in July and took over those projects previously carried out by D.L. Marchioni.

T. Jerzykiewicz, a former Postdoctorate Fellow at ISPG, joined the Geology of Coal Section in May, 1982.

W.D. Kalkreuth and A.R. Cameron planned a short course in coal petrology and wrote a manual for it. This work has been carried on with two other authors, D. Grieve of the

B.C. Ministry of Mines and Energy Resources and M.R. Bustin of the University of British Columbia. The course is to be given in May, 1983.

L.A. Kamenka resigned from Subdivision September 30, 1982 G.G. Smith and F.M. Dawson joined Subdivision in January, 1983 as Coal Resource Geologists.

Attendance at Meeting, Conferences and Courses

A.R. Cameron

Annual meeting of the International Committee for Coal Petrology, Oporto, Portugal; also visited coal research laboratories in Aachen, W. Germany and Cheltenham, U.K. during this European trip, April, 1982.

Fifth Symposium on the Geology of Rocky Mountain Coal, Park City, Utah, May, 1983.

Meeting of Canadian Coal Petrographers, Edmonton, November, 1982.

W. Kalkreuth

Annual Meeting of W. German Geological Association, Bochum, W. Germany, October, 1982.

F. Goodarzi

Meeting of Canadian Coal Petrographers, Edmonton, November, 1982.

K. Mottershead

Hewlett-Packard Transact 3000 course.

J.D. Hughes

11th Geochautauqua in Urbana, Illinois, October 1-2, 1982.

T. Jerzykiewicz

Eleventh International Congress on Sedimentology, McMaster University, Hamilton, Ontario, August, 1982.

D.W. Gibson

Coal Association of Canada annual meeting September 1982, Toronto, Ontario.

Special Talks or Lectures

A.R. Cameron

"Petrological Characteristics of Jurassic-Cretaceous Coals in the Foothills and Rocky Mountains of Western Canada" presented at Fifth Symposium of The Geology of Rocky Mountain Coal, 1982 (co-authored with W.D. Kalkreuth) May, 1982.

"Coal Petrology-What, How, Why" lecture presented to geology students at University of Alberta, Edmonton, January 1983.

F. Goodarzi

"Optical Properties of Thermally Altered Organic Matter" presented at Edmonton meeting of Canadian Coal Petrographers Group, November 1982.

W. Kalkreuth

"Rank and Petrographic Composition of Selected Jurassic-Lower Cretaceous Coals of British Columbia, Canada" presented at annual meeting of W. Germany Geological Association, Bochum, W. Germany, October, 1982.

D.T. Blackburn

"Studies on Different Types of Cuticles in Brown Coals relative to Coal Lithotypes" presented at Canadian Coal Petrographers meeting - Edmonton, November 1982.

B.D. Ricketts

"Bits and Pieces of Coal Geology in New Zealand" McConnell Club, May, 1982.

"Geology of Belcher Islands" McConnell Club, May 1982.

"The Kootenay-Blairmore transition (The Pocaterra Creek Member)". Coal Research Group, ISPG, April, 1982.

J.D. Hughes

"Computer-based methods for coal-basin analysis and resource assessment utilized in Canada's National Coal Inventory" presented at 11th Geochautauqua, October 1, 1982, Urbana, Illinois.

D.K. Norris, A.R. Cameron, D.W. Gibson and J.D. Hughes

Led a field trip for the geological support staff ISPG to examine the stratigraphy, sedimentology and structure of the coal measures of the Crowsnest Pass area in August, 1982.

Membership on Committees

A.R. Cameron

Member of DNAG Committee within Coal Division of GSA.

International Committee for Coal Petrology, member.

Chairman of Canadian Coal Petrographers Group.

W.D. Kalkreuth

International Committee for Coal Petrology, member.

F. Goodarzi

International Committee for Coal Petrology, member.

T. Jerzykiewicz

Editorial Board of Sedimentology (Blackwell Sci. Publ.) Journal of the International Association of Sedimentologists.

D.W. Gibson

CSPG Mesozoic of Middle North America Organizing Committee and Field Trip Committee, 1982, member.

IGCP Correlation of Coal-Bearing Formations Project 166, National Representative.

EMR Departmental Coal Committee, member.

J.D. Hughes

ERDS Technical Committee, member.

Registration committee member - 1983 CSPG meeting on Mesozoic of Middle North America.

ISPG Computer Committee.

K. Mottershead

ISPG Computer Committee.

B. Ricketts

CSPG Thesis Awards Committee, member, 1982.

CSPG Mesozoic of Middle North American, Registration Committee Chairman, 1982-83.

ISPG Library Committee, member, 1982.

Coal Technology Laboratory

About 1050 pellets of coal and dispersed carbonaceous material were cast and polished. A technique for making polished thin sections has been modified and improved and is now being used for some types of sample material, especially of the dispersed matter variety. With this method of preparation such specimens can be examined by both transmitted and reflected light.

PETROLEUM RESOURCE APPRAISAL SECRETARIAT

R. M. Procter

The Secretariat, which is a small staff group within ISPG, was created early in 1980. The Secretariat's major responsibility is for the preparation of estimates of Canada's potential oil and gas resources, including the provision and testing of methodology, convening of evaluation meetings, final responsibility for estimates and preparation of reports. The Secretariat provides functional direction to the GSC petroleum resource evaluation activities at ISPG and AGC and liaison with geologists and geophysicists in Canada Oil and Gas Lands Administration (COGLA).

The results of resource evaluation work done by GSC is communicated to a Petroleum Resource Appraisal Panel, chaired by the ADM Petroleum and consisting of ADM's in Energy, Science and Technology plus representatives from INA and the NEB. Panel meetings are held every 6 to 8 weeks to review specific resource base topics, identify priorities in evaluations, and to discuss oil and gas resource activity in general.

An additional role of the Secretariat is the curation of all resource estimate data and files and provision of data to downstream cost and supply analysis groups.

Highlights

Highlights for Petroleum Resource Secretariat include:

1. April 1982 - an assessment of the petroleum resources of Georges Bank by Wade, Lee, Taylor, & Procter. Prepared to assist in boundary dispute discussions.

2. June, 1982 - a review of Canada's Gas Resources. The 11th Panel report by Procter & Taylor reviewing gas reserves and potential by 7 stratigraphic slices.

3. August, 1982 - workshop on methodology and petroleum resource evaluation presented in conjunction with 3rd Circum Pacific Energy and Resource Conference, Honolulu by Procter, Lee & Taylor.

4. In response to initiatives developed by Minister Erola, a scientific liaison was established with the Bureau of Mineral Resources Geology and Geophysics for Australia. Procter, Taylor and J. P. Hea (Energy Sector) visited Federal and State geological surveys to discuss basin analysis resource evaluation methods and energy policy development. Several field trips were arranged and major oil industry operators were also visited.

5. October, 1982 - publication of oil and gas pool maps for Western Canada.

6. February, 1983 - Petroleum Resources of the Artic Islands Region was presented to 14th Panel meeting by Embry, Osadetz, Smith, Taylor & Procter. A revision of the region resources with emphasis on the Mesozoic part of the Sverdrup Basin.

Personnel Notes

The Secretariat currently consists of an Executive Director, four scientists, and a secretary.

R. M. Procter	- Executive Director
G. C. Taylor	- Senior Petroleum Geologist
P. J. Lee	- Senior Geologist - Resource Evaluation Methodology
M. Raicar	- Senior Heavy Oil Engineer
K. N. Nairn	- Senior Resource Systems Engineer
A. G. Foo	- Secretary

Attendance at Meetings, Conferences and Courses

R. M. Procter

AAPG Annual Meeting, Calgary, June 27-30, 1982.

Third Circum Pacific Energy and Mineral Resources Conference, August 18-28, Honolulu, Hawaii.

Tenth Energy Technology Conference and Exposition, February 28-March 2, 1983, Washington, D.C.

G. C. Taylor

AAPG Annual Meeting, Calgary, June 27-30, 1982.

Third Circum Pacific Energy and Mineral Resources Conference, August 18-28, Honolulu, Hawaii.

P. J. Lee

AAPG Annual Meeting, Calgary, June 27-30, 1982.

Third Circum Pacific Energy and Mineral Resources Conference, August 18-28, Honolulu, Hawaii.

Special Talks or Lectures

R. M. Procter

"Geological Survey of Canada's Approach to Petroleum Resource Evaluation," Petroleum Resource Assessment Symposium, Circum Pacific Conference, August 18-28, 1982, Honolulu.

"Petroleum Resource Evaluation in Canada" to Canberra Branch of Australian Institute of Energy, August 30, 1982, Canberra, Australia.

"Potential Gas Resources of Canada," Tenth Energy Technology Conference, February 28, 1983, Washington (with G. C. Taylor).

G. C. Taylor

"Petroleum Resources Evaluation Procedure - an example" Poster Session, AAPG, June 27-30, 1982, Calgary (with P. J. Lee and K. Wallace-Dudley).

"Central and Southern Rocky Mountains of Alberta and British Columbia," Field Trip and Guidebook, AAPG, July 1-4, 1982.

"Geology of a Canadian westcoast offshore play" to Petroleum Resource Assessment Symposium, Circum Pacific Conference, August 18-28, 1982, Honolulu.

P. J. Lee

"Petroleum Resources Evaluation Procedure - an example" Poster Session, AAPG, June 27-30, 1982, Calgary (with G. C. Taylor and K. Wallace-Dudley).

"Procedures for Petroleum Resource Assessment used by Canadian Geological Survey - Statistical Methodology" to Petroleum Resource Assessment Symposium, Circum Pacific Conference, August 18-28, 1982, Honolulu.

Membership on Committees

R. M. Procter

Chairman of Geological Potential Subcommittee

EMR Member of Board of Directors - Computer Modelling

Chairman of OERD Enhanced Oil Recovery sub-program (6.4) of Program 6 Conventional Oil and Gas.

P. J. Lee

Member of Geological Potential Subcommittee

M. Raicar

EMR Member of Technical Advisory Committee of Computer Modelling Group.

G. C. Taylor

Member of Geological Potential Subcommittee

K. M. Nairn

Member of ISPG Computer Advisory Committee.

GEOLOGICAL INFORMATION SUBDIVISION

N.C. Ollerenshaw

This subdivision is responsible for communicating the results of the Institute's programs to the federal and provincial governments, their officials and agencies; and to industry, the universities and the general public. This is achieved mainly through the screening and processing of manuscripts for publication in the Geological Survey's own series of papers, bulletins and memoirs, and in established national and international scientific and technical journals. Items of immediate interest, requiring rapid publication, are made available through an Open File system. In support of this objective, the Subdivision maintains capabilities and facilities in scientific editing and information, cartography, technical photography and library services. In addition, the Subdivision maintains a large inventory of, and operates as a retail outlet for, all Geological Survey papers, bulletins, memoirs and geological maps, and departmental topographic maps for western Canada and the Canadian Arctic. The Subdivision also communicates with the scientific community and the public by responding to direct requests for information, by preparing semi-popular articles and displays, by sending news reports to technical and scientific journals and newsletters, by lectures, and by participating in the work of committees and associations.

During the past year, the two members of the editorial staff processed 17 reports in the Geological Survey series, 50 outside papers and abstracts, 7 open file reports and 5 maps. After the resignation and departure of the scientific editor, Dr. E.R.W. Neale, in January, 1982, Dr. R.L. Christie and Dr. J.E. Brindle undertook terms as acting-editor until the appointment of Dr. N.C. Ollerenshaw as scientific editor on July 2nd, 1982. As a result of the changeover, the current backlog is in the order of 10-12 months. Processing of manuscripts involves the selection of critical readers and the evaluation of their reports, scientific editing, copy editing, proofreading and, in many cases, the layout of the publication. In 1982-83, for the first time, the Subdivision carried a manuscript (Bulletin 355 by Uyeno, T.T. and Barnes, C.R.) through the entire publishing process to its final printing in Calgary. I.S.P.G. involvement in the printing part of the process enabled the authors and technical staff to assert direct control over the quality of the paleontological plates with excellent results.

Most maps and illustrations produced by Institute scientists for publication are prepared in the Cartographic Section. To expedite publication, some are now prepared by the scientists themselves with the advice and guidance of our draftspersons. The work of the Section includes both black-and-white and multicoloured illustrations in addition to photo-mechanical and reproduction work. The Section also prepares slides for oral presentations and large graphic displays for workshops, meetings, and for information exchanges with universities. Good contacts are maintained with the local university and technical institute, lectures are given and students receive guided tours through our Cartographic complex as part of their course work.

The Photographic Section provides general and specialized photographic services for the institute staff. Preparation of paleontological plates is possibly its most demanding and unique function. This entails photographing fossils from various key angles and, together with microphotography, involves about 40 per cent of the Section's effort. Copy work accounts for close to 50 per cent of staff time. Miscellaneous activities include I.D. and passport photography, specialized photographic work for some other Government departments, and an increasing amount of publicity work illustrating personnel and equipment in action. A considerable amount of photographic work was undertaken this year for foreign scientists visiting the I.S.P.G. under exchange programs.

Personnel of the Geological Information Subdivision were heavily involved in I.S.P.G.'s Open House in November, 1982, producing cartographic and photographic displays of their own and providing scientific staff with material for their individual poster sessions.

Personnel Notes

Dr. N.C. Ollerenshaw was appointed Head of the Geological Information Subdivision and Scientific Editor on July 2nd, 1982. Dr. Ollerenshaw joined the Geological Survey of Canada in June, 1962 and is a founder member of the I.S.P.G. He is a specialist in Rocky Mountain Foothills geology and brings considerable experience and a lot of enthusiasm to his new job.

Flora Fritz joined us in January, 1983, from the University of Calgary, and has taken Dana Frank's position as Assistant Librarian.

Roxie DeGinnus joined us as Library Technician from August to October 1982, before leaving to accept a permanent position in another library.

Anna Thorsteinsson assisted us as a library clerk from November 1981 to August 1982, when she left to resume her university studies.

Don Stott Jr., joined the library as a summer student again this year during July and August.

Fontaine Hwang returned to her duties as Library Technician in December 1982 after being away on maternity leave.

Dana Frank left us in June to get married and settle in the United States.

Attendance at Meetings, Conferences and Courses

N.C. Ollerenshaw

Visit to GID/GSC Ottawa, September 29-October 1, 1982.

Association of Earth Science Editors, annual meeting, Williamsburg, Virginia, October 3-6, 1982.

M. Jones

Second International Conference on Geologic Information Processing, Golden, Colorado, May 1982.

F. Fritz

ORBIT - new system features workshop, February 1983.

Meeting of the Calgary Chapter of the Canadian Association of Special Libraries and Information Services (CASLIS) January 1983.

Membership on Committees

F. Fritz

CASLIS, Calgary Chapter

F. Hwang

Canadian Library Association

CASLIS, Calgary Chapter

L. MacLachlan

Chairman, I.S.P.G. Exhibits Committee

L. Machan-Gorham

Equal Opportunities for Women (P.S.C.)

Calgary Solar Energy Society

N.C. Ollerenshaw

I.S.P.G. Stratigraphic Nomenclature Committee, Member

Statistics on Subdivision Activities
April 1, 1982 - March 31, 1983

MANUSCRIPT PROCESSING SECTION

Format	Received	To Ottawa	To Publisher	Printed
Memoirs	4			3
Bulletins	1			9
Papers	4			4
82-1C	7	7		7
83-1A	2	2		2
Maps	8			4
Open Files	10	10		10
Outside	39		35	32
Abstracts	25		25	25

Geological Cartography Section

Maps and figures prepared by the Cartographic Section and sent to Ottawa for printing between April 1, 1982 and March 31, 1983.

	1981-82	1982-83
Multicolour maps and section sheets	5	5
Figure illustrations (page)	191	46
Figure illustrations (pocket)	1	41

Manuscripts received	1981-82	1982-83
Multicolour geological maps	6	3
Figure illustrations (page)	168	173
Figure illustrations (pocket)	8	17

Maps and illustrations in progress at March 31, 1983

	1981-82	1982-83
Multicolour geological maps	4	2
Figure illustrations (page)	142	149
Figure illustrations (pocket)	39	15

Miscellaneous drafting, which used over 30 per cent of the total drafting time, comprised 596 separate items, of which 363 were slides.

Reproduction Services	1981-82	1982-83
Diazo prints	4957	5591
Diazo prints (frame shots)	510	568
Di-chrome	196	477

Photomechanical Services	1981-82	1982-83
Film (sheets, negatives and positive)	2268	3903
Drafting keys on scribecoat	137	129
Blueline on Cronaflex	26	60
Colour Proofs	23	41
Peelcoats	151	54
C-1 prints	109	81
KC-5 prints	1013	2071
Autopositives (multiple exposure)	1460	768
Sepia (dry erasable film)	97	184

Camera Services	1981-82	1982-83
Film shots (line)	2774	3279
Film shots (halftone)	17	120
Paper	9	211

Photography Section

Production during the review years 1981-82 and 1982-83.

		1981-82	1982-83
1)	Total number of black and white continuous tone 4" x 5" negatives	1389	1398
2)	Total number of black and white prints	9536	10525
3)	Total number of contact proof sheets	728	886
4)	Total number of 35 mm films (black-and-white and colour) submitted for processing by staff members	111	228
5)	Total number of black-and-white 35 mm negative films	170	186
6)	Total number of 35 mm colour slide films	193	157
7)	Total number of colour negatives	72	253
8)	Total number of colour prints	107	1949
9)	Total number of 8" x 10" view graphs	-	22

The ISPG Library

The year proved to be a difficult one for the Institute Library as we lost our Assistant Librarian in June - she decided to get married and live in the Unites States, and at the same time our Library Technician left to have a baby thus reducing the staff by 50%. However, thanks to assistance from two term employees for a short time, and a summer student, we managed to maintain essential services to the Institute staff, although services to the public had to be curtailed somewhat.

We are now up to strength with the return of our Library Technician and the hiring of a new Assistant Librarian, and are able to supply a higher level of information services to the staff and increasing services to the public. Demand for information from the public sector has increased considerably over the last year in spite of a slow-down in exploration by the energy industry.

We have recently submitted a five-year plan to automate certain library procedures such as acquisitions and cataloguing and a feasibility study is now underway. The work involved will be considerable, but if the plan is implemented we should be able to provide faster and more efficient services in the future, and free an already overburdened staff from time-consuming manual routines. We look forward optimistically to the attainment of this goal.

Library Statistics

1982-1983

ACQUISITIONS	
Books, etc. acquired by purchase	843
Books, etc. acquired by gift or exchange	1179
Maps added	373
CIRCULATION	
Books and periodicals (to staff only)	10 216
Interlibrary loans	
Borrowed	350
Loans and photocopies provided	1345
ONLINE SEARCHES	75

Publications and Airphoto Section

Office Statistics

Charge Accounts: A total of 45 accounts were closed during the year. Twenty-two new accounts were opened, leaving a total of 194 accounts held in this office.

Correspondence and Orders: 3 247 orders and enquiries were received by mail during the year.

Telephone Calls: Approximately 14 000 calls were received during the year.

Visitors: a total of 11 079 persons visited the office during the year. As in past years, topographic maps were the items most often purchased but there was also an increased demand for geological maps. Publication of the new Oil & Gas Pool maps in November brought a large number of people to our office in the latter part of the year. Over 1 000 copies of the Oil & Gas Pool maps have been sold to date.

Breakdown of Deposits:

	1981-82	1982-83
Surveys & Mapping	$113,405.40	$96,316.80
Nat. Air Photo Library	13,645.76	12,352.98
GSC Maps	19,042.00	21,441.23
Rock & Mineral Kits	2,582.00	2,556.00
Misc. GSC Materials	1,307.25	1,098.13
GSC Publications	24,002.00	23,436.84
Mineral Development	237.75	269.00
Gravity Maps	100.50	150.00
	$174,322.66	$157,620.98

Breakdown of Accounts:

	1981-82	1982-83
Credit Sales	$92,304.25	$75,888.25
Cash Sales	81,459.86	83,229.63
Received on Account	93,162.80	74,391.35

Air Photos:

A total of 217 orders (157 prepaid) were forwarded to Ottawa during the year. These consisted of:

9255	Black and white contact prints
6	Colour contact prints
150	Flight line index maps
7	10" X 10" black and white enlargements
12	15" X 15" black and white enlargements
13	20" X 20" black and white enlargements
3	30" X 30" black and white enlargements
15	40" X 40" black and white enlargements
10	40" X 60" black and white enlargements
1	Black and white enlargement to scale
1	Colour enlargement to scale
1	20" X 20" colour enlargement
88	Diapositives
7	Transparancies
15	Landsat mosaics
5	Provincial landsat slide collections

Highlights

- The successful printing in Calgary of Bulletin 355 by Uyeno, T.T. and Barnes, C.R., demonstrated that ISPG has the expertise to produce first class publications with excellent plate reproduction.

- The success of I.S.P.G.'s Open House was in no small part due to the hard work and job excellence of the Cartography and Photography sections.

- The Geological Cartography Section did an excellent job of drafting the revised Western Canada Oil & Gas Pool maps (1558A and 1559A) and they were an instant success.

PRECAMBRIAN GEOLOGY DIVISION

J.C. McGlynn, Director

INTRODUCTION

This Division is responsible for all aspects of the bedrock geological framework of the Precambrian Shield. In addition, units of the Divison are charged with responsibility for isotope geochronological, petrological and paleomagnetic studies throughout Canada.

The objectives of the Division are: To provide a systematic study of the geological framework of the Canadian Shield to standards consistent with the needs for mineral resources discovery and evaluation of future resource potential; to provide isotope geochronology and paleomagnetic studies contributing to consistent correlation and to uniform presentation of the geology of Canada; to provide petrogenetic and metamorphic studies on major rock groups and metamorphic assemblages in Canada, directed toward solution of important problems.

The Division is organized into six sections and a special project group. Three of the sections are responsible for the regional geology of the Canadian Shield and are named after the structural provinces in which they work: Bear-Slave, Northern Churchill and Superior Grenville. These sections report their bedrock studies on geological maps at various scales and in reports and scientific papers. The Geochronology, Petrology and Paleomagnetic sections provide isotopic, petrologic and paleomagnetic studies by which age relations and processes of formation of rock assemblages are established. Special studies in the Division undertake bedrock studies in volcanology, Pecambrian stratigraphy and radioactive waste disposal.

The establishment consists of 62 continuing positions and 13 casual person years, largely used for employment of students for summer field work in the Canadian Shield.

Personnel Notes

Mr. G. Arnold retired from the Division in February.

M.B. Lambert was appointed Head of the Bear Slave Section in December.

I. Annesley, A. Galley, C. Hamblin, G. Marois, P. Nantais, J. Patterson, W. Penno, M. Picard and D. Thompson were appointed term support geologists for the Division for Fall and Winter.

ADMINISTRATION

Attendance at Meetings, Conferences and Courses

B. Cox

Information Processing System course, Xerox Canada Inc., Ottawa, August.

C. Gougeon

Information Processing System course, Xerox Canada Inc., Ottawa, August.

Written Communication, EMR course, Ottawa, January.

J. MacManus

French Language Training, Nepean High School and EMR, Ottawa.

Staffing, P.S.C., Ottawa, October.

J.E. Manning

French Language Training, Carson, Ottawa.

Principles, Algonquin College, Ottawa, May-June.

Office Management, Algonquin College, Ottawa, September-December.

Financial Management I, Asticou, Quebec, March.

J.C. McGlynn

Geological Association of Canada Annual Meeting, Winnipeg, Manitoba, May.

Management Orientation Program for Executives, Touraine, Quebec, March.

D. Wereley

Organizational Behavior, Algonquin College, Ottawa, September-December.

Stress Management, Embassy West Hotel, Ottawa, January.

Membership on Committees

J. MacManus

Technical Sessions Co-ordinator, GSC Current Activities Forum.

J.C. McGlynn

Centre for Precambrian Studies, University of Manitoba, Board of Directors.

Northwest Territories Coordinating Committee on work in the North.

Queen's University Advisory Council on Engineering.

International Union of Geological Sciences, corresponding member.

D. Wereley

GSC Christmas Party Committee.

BEAR-SLAVE SECTION

M.B. Lambert (Head)

Highlights

Field work in the externides of Wopmay Orogen led to several important breakthroughs in understanding the sedimentary and structural evolution of this Early Proterozoic (1.9 Ga) continental margin affected by three continental collisions. Down-plunge structure sections were constructed at both ends of Asiak thrust-fold belt documenting a minimum of 45 km eastward translation of the ancient continental shelf edge.

In the internal continuation of the thrust-fold belt (Hepburn Metamorphic-Plutonic Zone), three basement-cored anticlinal folds of the basal décollement were discovered. At the western exposed edge of the orogen is a deformed metamorphic-plutonic complex (Hottah Terrane) that appears to be geochronologically "exotic" relative to the continental margin on the east flank of the orogen.

U-Pb zircon chronology of the orogen, being studied cooperatively at University of Kansas, documents extremely rapid tectonic evolution, suggesting more rapid subduction of oceanic plates at that time.

The Thelon Tectonic Zone has been outlined as a major structure in the northwestern Precambrian Shield. Recent geological and aeromagnetic compilations and gravity data indicate that the zone is up to 100 km wide and at least 850 km long, stretching from Alberta across the MacDonald and Bathurst faults to the Arctic Coast. The preferred location for the boundary between the Slave and Churchill structural provinces is along the western edge of the Thelon Tectonic Zone. Evidence from metamorphic rocks indicates 10-30 km of crustal thickening and subsequent uplift and erosion are associated with the formation of this zone during Archean time and its reactivation in Proterozoic time.

In the southern Slave Province a gravity model for supracrustal rocks of the Yellowknife Supergroup predicts that mafic volcanics, which are abundant at the margin of an Archean basin, do not occur beneath the sediments in the central part of the basin. The volcanic successions accumulated along the margins of and subsequently were deformed against the walls of fault bound basins in the granitic basement.

A rare element study of granitoid rocks in the northeastern Slave Province has shown a genetic link for a suite of about 100 plutons, how REE are distributed in various plutons and how high grade metamorphism changes this distribution, and a common crustal not mantle derivation for intrusive and volcanic rocks of the region.

In the Fort Smith area of the western Churchill Province a recently documented granitic batholith of Hudsonian age (1944 $\pm$ 16 Ma) intrudes granulite facies gneisses of probable Archean age. Mylonitic zones separate these units from severely retrograded gneisses to the east and west. Deposition of the Nonacho and Tazin Groups either preceded or was coeval with this orogenic activity. Two new occurrences of vein scheelite have been found along the margins of the batholith in the northern parts of the area.

Synthesis of the Roberts Arm Group documents a submarine arc-tholeiitic volcanic shield overlying oceanic basalts within the central mobile belt of Newfoundland.

Personnel Notes

F.H.A. Campbell continued his secondment to Headquarters.

J.B. Henderson resigned as Head of the Section in December.

R.S. Hildebrand joined the Section in May for a 2-year term position.

M.B. Lambert participated in the International Crustal Research Drilling Group in Cyprus between June 23 and July 30.

P.H. Thompson continued to organize the seminar series "Precambrian High".

R. Tirrul joined the Section in June in a continuing RES 1 position.

Attendance at Meetings, Conferences and Courses

F.H.A. Campbell

Geological Association of Canada Annual Meeting, Winnipeg, Manitoba, May.

International Association of Sedimentologists Meeting, Hamilton, Ontario, August.

Prospectors and Developers Annual Meeting, Toronto, Ontario, March, 1983.

A. Frith

Geological Association of Canada Annual Meeting, Winnipeg, Manitoba, May.

Current Activities Forum, GSC, Ottawa, January.

R.S. Hildebrand

Geological Association of Canada Annual Meeting, Winnipeg, Manitoba, May.

GSC Precambrian Division Grenville Field Excursion, Parry Sound, Ontario, October.

Geological Society of America Annual Meeting, New Orleans, Louisiana, U.S.A., October 18-21.

GSC Current Activities Forum, Ottawa, January.

P.F. Hoffman

Canadian Geophysical Union Annual Meeting, Toronto, Ontario, May 10-12.

Geological Society of America Annual Meeting, New Orleans, U.S.A., October 18-21.

U.S. Precambrian D.N.A.G. Workshop, Denver, U.S.A., February 26-27.

M.B. Lambert

Canadian National Committee, International Union of Geodesy and Geophysics Meeting, Halifax, Nova Scotia, April 15.

GSC Current Activities Forum, Ottawa, Ontario, January 19-20.

R. Tirrul

Geological Society of America Annual Meeting, New Orleans, Louisiana, U.S.A., October 18-21.

GSC Current Activities Forum, Ottawa, January 19-20.

A symposium on Wopmay Orogen, sponsored by McGill University, Place Ville Marie, Montreal, Quebec, March 25.

Membership on Committees

F.H.A. Campbell

CANDEL Committee (Lithoprobe)

R.A. Frith

Branch representative, Field Equipment Committee.

M.Sc. Thesis Committee.

P.F. Hoffman

Corresponding member, IUGS Subcommission on Precambrian Stratigraphy.

Member of Working Group 3 (Proterozoic Lithoshere Evolution), International Lithosphere Project.

Editorial Board of Geology.

Editorial Board of Tectonics.

M.B. Lambert

Volcanology Division, Geological Association of Canada, representative on CNC/IUGG.
Thesis committees - 2 M.Sc., 1 Ph.D.

P. Thompson

Screening Committee for General Instructions for Field Parties.

Special Talks and Lectures

F.H.A. Campbell

"Correlation and Development of the Proterozoic Basins of Canada", GAC Annual Meeting, Winnipeg, Manitoba, May.

"Proterozoic Reefs of Canada", IAS Meeting, Hamilton, Ontario, August.

R.A. Frith

"Advances in our knowledge of the Slave Structural Province", Symposium on Archean Basins, GAC, Winnipeg, Manitoba, May.

Precambrian High presentation.

R.A. Hildebrand

"Volcanism of the LaBine Group, Conjuror Bay area, Wopmay Orogen, N.W.T." and "Magnetite-Apatite-Actinolite rocks, Great Bear Lake: Origin by groundwater convection in subduction-related intermediate plutons", Geological Association of Canada Annual Meeting, Winnipeg, Manitoba, May.

"A non-extensional model for the origin of continental intra-arc depressions, with a Proterozoic example from Wopmay Orogen", Gelogical Society of America Annual Meeting, New Orleans, Louisiana, October 21.

"Early Proterozoic accreted terrane and post-collisional magmatic arc, western Wopmay Orogen, N.W.T.", Virginia Polytechnical Institute, January; John Hopkins University, January; University of Connecticut, February; Adams Club special symposium, McGill University, Montreal, March.

P.H. Hoffman

"Wopmay Orogen and rapid subduction of Precambrian Oceanic Plates", Virginia Tech., Blachsburg, Va., U.S.A., October 22; Colorado Scientific Society, Boulder, Colorado, January 1; Rice University, Houston, Texas, February 23; University of Texas, Austin, Texas, February 25; University of Kansas, Lawrence, Kansas, February 28; McGill University, Montreal, Quebec, March 25.

M.B. Lambert

"Pyroclastic flows and surge deposits in subaerial and subacqueous environments", short course on metavolcanic rocks, Carleton University, Ottawa, April 2.

"Eruption of Mount St. Helen's, 1980", Hopewell Avenue Public School, Ottawa, May 14; I.C.R.D.G., Mitsero, Cyprus, June; Rouyn-Noranda Geological Discussion Group, Noranda, Quebec, October 6.

"Evolution of the Cameron and Beaulieu River Volcanic Belts, Slave Province, N.W.T.", "Bach River Complex - a cauldron subsidence complex of Archean Age" and "Review of the geology of ophiolites with emphasis on the Toodos complex", I.C.R.D.G. Training Program, Mitsero, Cyprus, June.

M. St. Onge

"Geology of the central Wopmay Orogen (early Proterozoic), Bear Province, and of the western Archean Slave Province; Redrock Lake and the eastern portion of Calder River map areas, District of Mackenzie", Yellowknife Geoscience Forum, Yellowknife, N.W.T., December.

M. St. Onge (con't.)

"Geothermometers and Geobarometers in pelitic rocks" and "Geothermometry and Geobarometry in pelitic rocks of north central Wopmay Orogen", Metamorphic Petrology Class, Carleton University, Ottawa, February 8 and 10.

"Metamorphic patterns in Wopmay Orogen: Evolution of Regional Low Pressure Thermoculmination", Wopmay Orogen Symposium, McGill University, Montreal, March.

P.H. Thompson

"Polymetamorphism in the Healy Lake Map Area - Implication for the Thelon Tectonic Zone", Current Activities Forum, Geological Survey of Canada, Ottawa, January 19.

"Le polymétamorphisme dans la région du Lac Healey - Les implications pour la zone tectonique Thelon", Université du Québec à Chicoutimi, Québec, February 9.

"Regional Metamorphism in Time and Space", Université du Québec à Chicoutimi, Québec, February 9 and Carleton University, Ottawa, March 1.

R. Tirrul

"Minimum supracrustal shortening estimate, northern Asiak Thrust and Fold Belt, N.W.T.", GSA Annual Meeting poster presentation, New Orleans, October 18, and Geoscience Forum, GSC, Ottawa, January 19.

"'Calderan' structure of Asiak Foreland Thrust and Fold Belt, N.W.T." and "Regional pure shear deformation by conjugate transcurrent faulting, Externides of Wopmay Orogen", Wopmay Orogen Symposium, Montreal, Quebec, March 25.

Manuscripts Submitted

5 Open File Maps, 1 GSC Bulletin, 3 GSC Papers, 9 Abstracts 3 Current Research Papers, 7 Outside Publications.

NORTHERN CHURCHILL SECTION

A.N. LeCheminant (Head)

Highlights

The Section's regional 1:250 000 mapping program continued with three new projects in the District of Keewatin west and north of Baker Lake. Studies span four northeasterly trending supracrustal belts and eastern parts of the Thelon Basin. Highly deformed, greenschist grade metasedimentary rocks of the Chantry Group form a narrow belt that breaks up southwestward into the Slave-Chantry mylonite zone. These supracrustals are apparently older than the subparallel Montresor and Amer belts of Aphebian Amer Group rocks to the south. The Montresor belt of weakly metamorphosed quartzitic rocks with minor schist and marble is folded into an open syncline without the northerly directed thrust faults that affected rocks of the Amer belt 60 km to the south. Stratabound uranium mineralization occurs within greenschist facies pelitic-psammitic metasedimentary rocks of the Amer belt. The Aberdeen Lake belt of metagreywacke with minor schist, quartzite and banded iron formation is cut by large plutons of fluorite granite and smaller bodies of younger syenite. Pyritic iron formation and metapelites contain anomalous Au and Ag. Correlation of this belt with Archean and possible Aphebian orthoquartizite-bearing metasedimentary-metavolcanic sequences along strike to the northeast awaits detailed mapping in the Schultz Lake area.

Extensive weathering occured before and during deposition of rhyolitic flows and fluvial and aeolian sandstones of uppermost formations of the Proterozoic Dubawnt Group in the Thelon Basin. Silcretes show evidence of several episodes of silicification and brecciation related in part to synsedimentary faulting. Phosphate disseminations and veinlets in the regolith are spatially associated with phosphate-cement and basal Thelon Formation sandstones. Isotopic studies on uraniferous fluorapatite indicates a minimum age of 1.67 Ga for the regolith and deposition of the basal sandstones. A topical study of Archean weathering profiles from localities in the Slave, Superior and Churchill structural provinces suggests there is no need to postulate different weathering and/or ground water systems were operative during the Archean compared to more recent times.

Reconnaissance mapping of the nunatak terrain of the Devon Ice Cap confirmed the rocks to be granulite facies gneisses of supracrustal origin which can be followed to, or correlated with, previously mapped rocks on the coast.

Topical investigation of the Thule Group of eastern Ellesmere Island and northwestern Greenland contributed paleocurrent and stratigraphic data to improve correlations made with the Bylot Supergroup of Baffin Island.

To complement the 1:1 000 000 geologic map of NTS 55, 65 and part of 75 completed last year, work has started on a preliminary 1:1 000 000 compilation of the District of Keewatin north of 64°. This map highlights the spatial relationships of supracrustal belts in this poorly known area. Integration of geophysical data with known locations of mylonites has located several regional mylonitic zones, most of which appear to have multiple deformation histories and late dextral offsets.

Attendance at Meetings, Conferences and Courses

J.R. Henderson

International Conference on Planar and Linear Fabrics of Deformed Rocks, Zurich, Switzerland, August 30-September 2.

Spcecial meeting of Tectonics Studies Group on the Northern Margin of the Hercynides in the North Atlantic Region, Dublin, Eire, September 13-14.

Canadian Tectonics group, Gravenhurst, Ontario, October 23-24.

J.R. Henderson (cont'd.)

Nova Scotia Department of Mines and Energy, 6th Annual Open House and Review of Activities, December 1-2.

GSC Current Activities Forum, Ottawa, January 19-20.

G.D. Jackson

Geological Association of Canada Annual Meeting, Winnipeg, Manitoba, May 17-19.

Regional Geological Field Trip, Parry Sound Region, Ontario, September 26 - October 1.

A.N. LeCheminant

GAC-MAC Annual Meeting, Winnipeg, Manitoba, May 17-19.

GSC Current Activities Forum, Ottawa, January 19-20.

Prospectors and Developers Association Meeting, Toronto, Ontario, March 7-9.

Wopmay Symposium, Montreal, Quebec, March 25.

S. Tella

Geoscience Forum, Yellowknife, N.W.T., December 8.

GSC Current Activities Forum, Ottawa, January.

Membership on Committees

T. Frisch

GSC Ottawa Library Committee - Precambrian Division representative.

S. Tella

Precambrian Division Representative, Branch Safety Committee (field component).

External examiner, B.Sc. Thesis Committee, Carleton University.

Special Talks and Lectures

T. Frisch

"Granulite facies metamorphism and anatexis in south eastern Ellesmere Island, Arctic Canada", GSC Current Activities Forum, Ottawa, January 19.

"Some highlights of southern African geology", Ontario Geological Survey, Toronto, January 28.

J.R. Henderson

"Structural development of the Foxe Fold Belt in northeast Canada", University of Copenhagen, Inst. of General Geology and Greenland Geological Survey, Denmark, Sept. 6; Aarkus Univ. of Geology, Sept. 7 (Denmark); and Univ. of Massachusetts, Dept. of Geology, Amherst, U.S.A., February 25.

G.D. Jackson

"Baffin Island - A Geologist View", Westboro United Church Men's Club, Ottawa, May 3.

A.N. LeCheminant

"Magma Mixing in Lamprophyres and Granites, Central District of Keewatin", Poster Session GAC, Winnipeg, Manitoba, May 17.

"Geological compilation at 1:1 000 000 of the District of Keewatin north of 64°", Poster Session, Current Activities Forum, Ottawa, January 19-20.

"Magmatic History of the Baker Lake Basin", Concordia University, Montreal, P.Q., February 10.

S. Tella

"Geology of the Deep Rose Lake Map area, District of Keewatin, N.W.T.", Yellowknife, N.W.T., December 8.

"Regional geology and tectonics in the Central District of Keewatin, N.W.T.", Queen's University, Kingston, Ontario, January 27.

Manuscript Submitted

1 GSC Paper, 2 A Series Maps, 4 Outside Publications, 2 Open File Maps, 6 Current Research Papers, 3 Abstracts.

SUPERIOR-GRENVILLE

A. Davidson (Head)

Highlights

Reconnaissance mapping and topical studies in various parts of the Superior Province are revealing new elements contributing to understanding the overall structure and history of this Archean craton. In Western Ontario, high grade migmatitic rocks of the English River subprovince display metamorphic zonation, through identification of key isograds, to granulite facies; structure in part of Wawa subprovince can be related to forceful intrusion of small monzonitic plutons into granitoid gneisses. In the Nakina area, extensive mafic metavolcanic gneisses in Wabigoon sub-province, altered felsic metavolcanic rocks in the Melchett Lake greenstone belt in English River subprovince, and post-Paleozoic (post-Cretaceous?) faulting along the south margin of the Moose River basin have been identified. Regional compilation coupled with geophysical modelling are providing new insights into regional features: the Kapuskasing structural zone, bounded to the east by a west-dipping thrust zone, exposed the structure and make-up of a deep section of the Archean crust; The Proterozoic Sudbury complex appears to be underlain by a dense, magnetic mass that may be a deep mafic and ultramafic body cogenetic with the Sudbury Irruptive. East and northeast of James Bay, vast regions of granodioritic rocks enclose numerous supracrustal remnants and /or pre-Kenoran mafic dykes; complex structural patterns reveal at least two phases of deformation.

Follow-up studies in the Archean Hopedale block, Labrador, have established a chronological succession of events through dating of mafic dyke swarms; a major period of metamorphism in Makkovik subprovince is thus constrained to the early Proterozoic.

In the southwestern Grenville Province, Ontario, continuing reconnaissance investigations in the Algonquin region have outlined cell-like domains of granulite bounded by curviplanar zones of highly strained gneiss, and have confirmed the presence of a thick ductile thrust zone at the northwest edge of the Central Metasedimentary Belt. Initial detailed study on the mechanism of deformation and sense of displacement in major shear zones south of Parry Sound has outlined large-scale rotated blocks with structures compatible with northwesterly displacement.

Nuclear Fueld Waste Management Program

I.F. Ermanovics

Highlights

Characterization of major fractures in subsurface granite of the Lac du Bonnet Batholith in Manitoba has prompted excavation of the shaft that is to lead to the vault of AECL's Underground Research Laboratory.

Geological and geophysical models of fractures, and of the shape of the East Bull Lake gabbro-anorthosite in Ontario are being tested by means of 2100 metres of cored diamond drill holes.

A preliminary summary of geoscience work on the Eye-Dashwa lakes granite in Ontario has led to the design of a new schedule of geological and geophysical work on the granite in two areas of 4 km^2 each to test if subsurface fracture characteristics are similar to those observed at surface.

Personnel Notes

N. Culshaw joined the Section as a term support geologist.

I.F. Ermanovics continued his secondment as Manager of the Radioactive Waste Disposal Program.

S.K. Hanmer joined the Section in July in a continuing RES 2 position.

Attendance at Meetings, Conferences and Courses

K.D. Card

GAC-MAC Annual Meeting, Winnipeg, Manitoba, May.

IUGS Precambrian Sedimentology Working Group Meeting, Whitefish Falls, Ontario, September.

A. Ciesielski

Information Seminar, Ministry of Natural Resources and Energy, Quebec City, November.

A. Davidson

Friends of Grenville Meeting and Field Excursion, Parry Sound, Ontario, October 1-3.

Canadian Tectonics Group, 2nd Annual Meeting, Gravenhurst, Ontario, October 22-24.

I. Ermanovics

GAC Annual Meeting, Winnipeg, Manitoba, May.

The Canadian Nuclear Society, Annual Meeting, Winnipeg, Manitoba, September 13-16.

Euratom, Community of European Communities, Brussels, Belgium, September 28-October 1.

Sweden-Canada Corporation for Nuclear Fuel Waste Management, Stockholm/Uppsala, Sweden, October 2-6.

Review of Current Research, Dept. Mines and Energy, MDD, St. John's, Newfoundland, November 3-4.

S. Hanmer

Conference on Planar and Linear Fabrics, Zurich, Switzerland, August 29-September 6.

The Northern Margin of the Hercynides in the N. Atlantic Region, Dublin, Eire, September 13-14.

Precambrian field trip, Georgian Bay, Ontario, October.

Canadian Tectonics Group, Gravenhurst, Ontario, October 23-24.

J. Percival

GAC/MAC Annual Meeting, Winnipeg, Manitoba, May 17-19.

Archean Geochemistry Field Conference, Wyoming, U.S.A., August 15-19.

Ontario Geological Survey, Geoscience Research Forum, Toronto, December 8-9.

Membership on Committees

K.D. Card

North American Stratigraphic Commission

Editorial Board of Geology.

Corresponding member, IUGS Precambrian Stratigraphic Commission.

A. Davidson

GSC Age Determinations Committee (inactive).

Decade of North American Geology, Precambrian Shield Volume.

A. Davidson (cont'd.)

Carleton University, M.Sc. thesis committees for M.J. Murray and L. Nadeau; Ph.D. thesis committee for B. Brock.

I. Ermanovics

Geosphere Modelling Working Group, Applied Geoscience Branch, AECL, Pinawa, Manitoba.

Research Areas Operations Committee, Nuclear Fuel Waste Management Program, AECL, Pinawa, Manitoba.

Program Managers Committee, NFWM/AECL, Terrain Sciences Division, EMR.

J. Percival

Precambrian Division representative on Current Activities Forum organizing committee.

Precambrian Division representative on committee to investigate Landsat imagery proposal.

Special Talks and Lectures

K.D. Card

"Structure and Evolution of Archean Crust in Central Superior Province", Geological Association of Canada, Winnipeg, Manitoba, May.

"Geology and gravity signture of Kapuskasing Uplift, a window through the Abitibi-Michipicoten Greenstone Belt" (with J. Percival and A. Goodacre), Geological Survey of Canada, Current Activities Forum, Ottawa, January.

A. Ciesielski

"Geology of Ungava Subprovince, Quebec", Université de Québec à Montréal, March 31.

A. Davidson

"Large-scale structural patterns in the Central Gneiss Belt, Grenville Province of Ontario"; Canadian Tectonics Group, 2nd Annual Meeting, Gravenhurst, Ontario, October 22-24.

"Regional synthesis of the western Grenville Province", University of Toronto, February 21 and Carleton University, March 8.

I. Ermanovics

"Tectonic evolution of the Archean and early Proterozoic of the Hopedale block, Labrador, Newfoundland" - with J. Korstgard, Department of Geology, Aarhus University, Aarhus, Denmark at Geological Association of Canada Annual Meeting, Winnipeg, Manitoba, May.

"Preliminary geoscience survey results of the East Bull Lake map area, Ontario", with R.A. Gibb, Earth Physics Branch and N. Soonawala, AECL, at Euratom, Community of European Communities, Brussels, Belgium, September 28-October 1.

"The Canadian plutonic rocks program for the Nuclear Fuel Waste Management Program", Sweden-Canada Cooperation for Nuclear Waste Management, Stockholm, Uppsala, Sweden, October 2-6.

"The Canadian Geoscience Program for the Nuclear Fuel Waste Management Program", Department of Mines and Energy, St. John's, Newfoundland, November 3-4.

S. Hanmer

"The N.E. Newfoundland Shear Zone", Dublin, Eire, September.

"The Mechanical Effect of Anisotropy in 3-D Strain: Experimental Results" (Poster), Canadian Tectonics Group, Gravenhurst, Ontario, October 24.

"Short Course in Structural Geology" - Six in-house lectures to the Precambrian Division, Ottawa, November-December.

J. Percival

"Archean and Proterozoic Tectonics in Central Superior Province", Archean geochemistry conference, August.

Manuscripts Submitted

5 Abstracts, 10 Outside Publications, 3 Current Research Papers, 6 Open File Maps, 1 Field Guidebook, 1 GSC Paper.

SPECIAL PROJECTS

Stratigraphy and Geochemistry of Volcanic Rocks of the Circum-Ungava Belt

W.R.A. Baragar

Highlights

Better understanding of ophiolites and volcanogenic ores was achieved after participating in the deep drilling program of the Cyprus study project, Mitsero, Cyprus. Attachment to this project continued through the year. Summer field work, in July and August, consisted of detailed mapping of Cape Smith Island and the adjoining mainland.

Lower Paleozoic Geology of Eastern Canada

B.V. Sanford

Highlights

Geological research in Paleozoic terranes of Eastern Canada was focussed on two principal activities:

(i) subsurface geology of the eastern rim of the Michigan basin in Ontario to assess the feasiblity of deep underground disposal of high-level nuclear wastes in salt, shale and limtestone deposits, and
(ii) the reconstruction of Phanerozoic and recent tectonic history of platformal regions and intervening Canadian Shield as a basis for the selection of structurally stable areas for radioactive waste disposal, the siting of nuclear and hydro-electric generating systems and future prediction of major earthquake epicentres in Eastern Canada.

(i) Activities in the eastern rim of the Michigan Basin of Ontario have served to identify and define numerous major fracture systems hitherto unknown. Although these systems will undoubtedly prove to be a major hazard and deterrent to any form of underground disposal and/or storage, they open up a whole new spectrum of hydrocarbon trapping mechanisms which should greatly increase the oil and gas potential in all four systems represented in southwestern Ontario from Cambrian through Ordovician, Silurian to Devonian inclusive.

(ii) To more accurately assess the structural imprint of Phanerozoic and more recent tectonic events on the Canadian Shield and adjacent platformal regions a study of landsat imagery was initiated in 1982, the objective of the study is to map large scale fracture systems that are believed to have been triggered and controlled by Phanerozoic tectonic events in one or another of the Appalachian, Cordilleran or Innuitian Orogens which border the St. Lawrence Interior and Arctic Platforms on the south, west and north respectively. One important finding to emerge from the study to date is the close association of apparent fault block rotation and large concentrations of earthquake epicentres that occur principally along the outer margins of the several major basement arches that trend in dominant northeast and northwest directions at a number of localities across the central craton of Canada.

Personnel Notes

F. Thompson joined the Section as term support geologist working with B.V. Sanford.

Attendance at Meetings, Conferences and Courses

W.R.A. Baragar

Meeting of the Management Panel, International Crustal Research Drilling Group, Nicosia and Mitsero, Cyprus, May 3-4.

Meeting of the Canadian Group, Cyprus Crustal Study Project, Halifax, Nova Scotia, January 4-5.

B.V. Sanford

Geological Association of Canada Annual Meeting, Winnipeg, Manitoba, May 17-19.

F.C. Taylor

Prospectors and Developers Association, Annual Meeting, Toronto, Ontario, March 7-9.

Membership on Committees

W.R.A. Baragar

Management Panel, International Crustal Research Drilling Group.

Ph.D. Thesis Committee, Irvine Annesley, Ottawa University.

Editorial Committee, Canadian Journal of Earth Sciences.

B.V. Sanford

Member of Advisory Committee on Undersea Features to Canadian Permanent Council on Geographic Names.

Special Talks and Lectures

B.V. Sanford

"Tectonic History of the Canadian Shield in the Phanerozoic", Geological Association of Canada Annual Meeting, Winnipeg, Manitoba, May.

"AECL Geological Research Programs on Salt Basins of Canada", Senior officials of Saskatchewan and Nova Scotia Departments of Energy, Mines and Environment, Halifax, Nova Scotia, July 12; Regina, Saskatchewan, August 31.

"Cratonic Basins - The Eastern Rim of the Michigan Basin and Application of Basin Analysis", Geological Survey of Canada Seminar, Ottawa, October 6.

"Phanerozoic Tectonic History of the central Craton", AECL Workshop on Transitional Processes, November 4.

Manuscripts Submitted

3 Outside Publications, 1 Abstract, 1 Map.

GEOCHRONOLOGY SECTION

O. van Breemen (Head)

Highlights

The commissioning of the MAT 261 solid source mass spectrometer in November 1982 has initiated a new era of capability in isotopic analysis. The instrument has lived up to the high expectations of double and multiple Faraday cup isotopic analysis having achieved extremely precise results for strontium, neodymium and lead isotopic ratios in the limited time to date. Replicate completely automated analyses of samples of known isotopic composition have been demonstrated to our satisfaction although this complete automation facility has not yet been integrated into our routine operations.

After considerable back-up work and various calibrations, the new mass spectrometer has been producing reliable Rb-Sr analyses for the first three months of 1983. A number of useful results have been obtained such as the demonstration of a single pulse of two mica pegmatite emplacement near the end of the Archean events in the Healey Lake sheet, District of Mackenzie.

Mass spectrometric analysis of common Pb isotopes has commenced and U-Pb analyses of zircons will follow soon. Following the previous year's overhaul of zircon concentration and purification procedures, various selection and abrasion techniques have been applied to populations from Precambrian Shield, Arctic and Appalachian rocks and a considerable number of zircon fractions are now ready for chemistry.

A great deal of detailed planning has gone into the final drawings for the anticipated complex of three new separate clean chemistry laboratories for processing U-Pb in zircon, common Pb in silicates and Rb-Sr and Sm-Nd in various rocks and minerals. Concepts of air filtration, positive laboratory pressure and humidity control have been designed into a convenient and flexible arrangement of exhausted work stations.

In anticipation of these facilities, discussions and planning have proceeded with experts from Chalk River concerning the utilization of high pressure liquid chromatography techniques for rapid and clean separation of Sm and Nd for mass spectrometric analysis.

The HP9826A computer has been programmed for regression analysis of Linear Rb-Sr and U-Pb data and graphical representation of this data on a newly acquired plotter. A dual drive disk has been integrated into the MAT 261 computer system.

Personnel Notes

R. Parrish joined the Section in February in a continuing RES position.

M. Firko and P. Hunt joined the Section as term support geologists.

Ms. D. Bellerive began maternity leave in January.

Field Activities

C. Roddick spent 3 weeks in Keewatin District with A.N. LeCheminant and S. Tella, assisting in mapping and collecting rock samples for a collaborative dating project.

O. van Breemen collected samples for U-Pb zircon geochronology from the Grenville gneiss and granulite terrain around Parry Sound, Georgian Bay with A. Davidson.
He visited and discussed with K.L. Currie, geochronology sampling in the Cape Breton Highlands; an area presently being mapped by R.A. Jamieson.

He also visited and collected geochronology samples from the Rainy Lake and Puddle Pond areas, Newfoundland, with K.L. Currie, J.B. Whalen and R.K. Herd.

O. van Breemen attended, with R.W. Sullivan, the Precambrian Field Trip to the Grenville, Parry Sound, Ontario, organized by A. Davidson.

Attendance at Meetings, Conferences and Courses

W.D. Loveridge,

Basic computer language, Ottawa, May 31-June 4.

F.B. Quigg

Basic for Minis and Micros, Ottawa, May 31-June 4.

Hewlett-Packard Computer I/O course for desk top computers, Hewlett-Packard, Ottawa, January 17-18.

J.C. Roddick

American Geophysical Union Spring Meeting, Philadelphia, U.S.A., May.

Fifth International Conference on Geochronology, Cosmochronology, Isotope geology, Nikko, Japan, June.

GSC Current Activities Forum, Ottawa, January.

Hewlett-Packard Computer I/O course, Ottawa, January.

K. Santowski

Basic computing, Ottawa, May 31-June 4.

O. van Breemen

Basic Computing, Ottawa, May 31-June 4.

Precambrian Field Trip, Parry Sound, Ontario, October 1-3.

Geological Society of America, 1983 Northeastern Section Meeting, Kiamesha Lake, New York, March 23-25.

Membership on Committees

R.W. Sullivan

Branch Safety Committee.

O. van Breemen

EG-ESS Evaluation Committee, Branch Member.

Special Talks and Lectures

R. Parrish

"An intermediate's guide to geochronology with application to thermal history" and "Fission Track Dating - theory and application to uplift of mountain belts", talks for "Precambrian High" Series, GSC, Ottawa, February/March.

J.C. Roddick

"High Precision Intercalibration of ^{40}Ar-^{39}Ar Standards", Nikko, Japan, June.

Geochronology course, "Precambrian High" Series, GSC, Ottawa, March.

O. van Breemen

"Dating structural fabrics with muscovite as porphyroblasts and in pegmatites: from the Highlands of Scotland", University of Toronto, Ontario, December.

"Temporal and isotopic tracer evidence linking events in the subduction zone and orogen of the Scottish Caledonides", University of Toronto, Toronto, Ontario, December, and North Appalachian Geochronology Symposium, Geological Society of America meeting, Kiamesha Lake, New York, March.

Manuscripts Submitted

1 GSC Bulletin, 11 Current Research Papers, 10 Outside Publications, 1 GSC Paper.

Laboratory Statistics

K-Ar ages reported	40
Rb-Sr isochron projects	15
U-Pb zircon age projects	5

PALEOMAGNETIC SECTION

W.F. Fahrig (Head)

Highlights

Laboratory work progressed well on collections from sedimentary, volcanic and intrusive rocks of the Thule Group from Ellesmere Island and Greenland, from volcanic rocks of the Ottawa Islands, and from Nipissing diabase and northeast dykes in northeastern Ontario.

Personnel Notes

R. Everrit joined the Section as a term support geologist.

Membership on Committees

W.F. Fahrig

External examiner, FCAC Committee.

Manuscripts submitted

7 Outside Publications.

PETROLOGY SECTION

K.L. Currie (Head)

Highlights

The Petrology Section analyses rock and mineral assemblages with the object of understanding and quantifying the processes of rock formation and transformation. Detailed field studies supply material for analysis and provide an opportunity for the application of models worked out in the laboratory. The section includes laboratories for the study of rock forming processes at high temperatures and pressures, and a petrographic laboratory providing services, working space and instruments for petrographic analysis.

The Carboniferous section near St. John, N.B. is an authochthonous alluvial fan sequence resting unconformably on Late Precambrian volcanics, not an allochthonous slice as previously proposed. Only small relicts, possibly imbricate slices, of the allochthon occur along the sea shore, associated with gold mineralization in the sole fault.

Mapping between Flin Flon and Sherridon, Manitoba suggests the boundary between the Flin Fon volcanic belt and the Kisseynew gneiss belt to be an unconformity. The metamorphic grade remains the same across the boundary.

Sr and Nd studies of the Harp Lake complex demonstrate progressive increase in initial Sr ratios with fractionation, suggesting progressive incease in initial Sr ratios with fractionation, suggesting progressive crustal contamination during evolution. Overall isotopic characteristics resemble those of the Kiglapait and Shabogamo gabbros of similar age.

A survey of equations of state for supercritical fluids was completed. Ten were chosen as applicable to geologically interesting conditions and used to fit PVT data for gases in the C-H-O-S system. Preliminary analysis suggests that none of the equations are satisfactory for polar gases.

The Springdale Group sedimentary rocks of Newfoundland did not accumulate by transport down a northeast trending trough, as previously supposed, but by complex mechanism involving major alluvial fans. A zircon age from presumed equivalent rhyolite in the King George IV Lake area shows the braided fluvial redbed sequence to be of Silurian age, and definitely older than a grey meandering fluvial sequence containing volcanic pebbles, presumed to be of Carboniferous age. This date settles a controversy bearing on the post-ophiolite emplacement history of western Newfoundland.

Completion of mapping of the Topsails terrane of western Newfoundland shows it to include the Ordovician volcanics of the Glover Formation and the Precambrian Hungry Mountain complex. The characteristic alkali granites extend the length of the terrane. The equant shape, non-foliated rocks, and fault-bounded character of this terrane suggest that this part of Newfoundland consists of a tesselate pattern of terranes, rather than a few elongate zones as previously thought.

Personnel Notes

J.B. Whalen completed a two year term as a Visiting Fellow in February, 1983, and accepted a one year contract.

R.K. Herd left the Section in February, to become curator of the branch rock and mineral collections.

M. Letarte joined the Section in October as a term support geologist.

Attendance at Meetings, Conferences and Courses

F.W. Chandler

Geological Association of Canada, Newfoundland Section, Newfoundland, April.

Meeting on Sediments and Stratabound Economic Minerals, with special reference to Atlantic Canada, St. John's, Newfoundland, April.

International Geological Correlation Program, Projects 91, 157, 160, London, England, May 13-14.

Regional trends in the geology of the Appalachian-Caledonian-Hercynian-Mauritanide Orogen, NATO conference, Fredericton, New Brunswick, August 12-17.

K.L. Currie

New Brunswick Department of Natural Resources Open House, Fredericton, New Brunswick, November 28.

Geological Society of America, Northeastern Section, Kiamesha Lake, New York, March 23-25.

R.F. Emslie

Grenville Field Excursion, Parry Sound, Ontario, October 1-3.

E. Froese

GAC/MAC Meeting, Winnipeg, Manitoba, May 17-19.

Annual Meeting, Manitoba Mineral Resources Division, November 18.

T.M. Gordon

Saskatchewan Geological Survey, Saskatoon, November 17.

Manitoba Department of Energy and Mines, Annual Meeting, Winnipeg, Manitoba, November 18.

GSC Current Activities Forum, Ottawa, January 19-20.

R.K. Herd

Precambrian Division Field Trip, Parry Sound, Ontario, September 27-30.

GAC Newfoundland Section, Annual Fall Meeting, Stephenville, Newfoundland, October 1-3.

J.B. Whalen

Northeastern section, Geological Society of America, Kiamesha Lake, New York, March 23-25.

Membership on Committees

F.W. Chandler

Secretary, Logan Club, GSC.

Member, I.G.C.P. Working group - combined Projects 91, 157 and 160.

T.M. Gordon

Branch Computer Facilities Committee.

Standing Subcommittee on New Technology for Data Land Information Acquisition and Processing.

Special Talks and Lectures

F.W. Chandler

"Research in the Springdale Group and related rocks", Mineral Development Division, Mines and Energy, St. John's, Newfoundland, April.

"The influence of the Wilson Cycle on Metallogenesis in Sediments; an early Proterozoic example from Eastern Hudson Bay, Canada" and "Sedimentary and diagenetic processes in Precambrian metallogenesis", International Geological Correlation Program Meeting, Geological Society, London, England, May 13-14.

K.L. Currie

"Geology of the Saint John Region", New Brunswick Department of Natural Resources Open House, Fredericton, New Brunswick, November 28.

"Geochronologic evidence for basement re-activation in the Canadian Appalachians", Northeastern Section GSA, Kiamesha Lake, New York, March 23.

E. Froese

"Metamorphism of sulphide deposits and alteration zones - an introduction", GAC/MAC, Winnipeg, May.

"Petrogenetic grids and metamorphic grade", Carleton University, Ottawa, January.

T.M. Gordon

"Heat Flow in Metamorphism", Precambrian Division, GSC, Ottawa, April.

R.K. Herd

"Geology along Route 480, The Burgeo Road", Field Trip, Newfoundland, October 1.

"Metamorphic Reaction Textures - some pristine examples", Carleton University, Ottawa, February 15

Manuscripts Submitted

2 Open File Maps, 2 GSC Papers, 4 Abstracts, 5 Current Research Papers, 6 Outside Publications, 1 Field Guidebook.

RESOURCE GEOPHYSICS AND GEOCHEMISTRY DIVISION

A.G. Darnley, Director

The objective of the Division is to provide geophysical and geochemical information on a nationally consistent basis (a) to facilitate the discovery, evaluation and transportation of Canada's mineral (principally metalliferous) resources, and (b) to improve knowledge of the country's subsurface geology:

- by conducting appropriate R&D relating to existing and new methods of exploration technology, data interpretation and presentation;
- by undertaking the R&D necessary to establish national measurement and reporting standards in exploration geophysics and geochemistry;
- by obtaining and compiling geophysical and geochemical data for systematic national or regional surveys;
- by providing interpretations relevant to specific geoscientific questions and problems.

The Division serves as a national centre for research and development into geophysical and geochemical methods relating to metalliferous exploration, economic, regional, engineering, and environmental geology. It provides advice on these matters at national and international levels. The foundation for this advisory function is provided by the continuing activities which include: research, development, testing and experimental use of new geophysical and geochemical methods; the establishment of relevant calibration and standardization procedures; and the progressive development of improved methods of presenting multi-parameter geophysical and geochemical data in an informative manner. The Division is thus in a position to design, manage, operate where necessary, and interpret geophysical and geochemical surveys for a wide variety of applications ranging from purely local to national requirements.

Following several years when there has been a general sense of shrinking horizons and shrinking opportunities within which to apply the expertise of the Division (punctuated at frequent intervals by the scrutiny of bands of auditors) there have been signs during 1982/83 that a new era may be approaching. At last there are some signs that problems such as ageing equipment and facilities, diminishing ability to enter new fields of R&D through lack of capital, people and space, and the administrative obstacles to productivity erected in the name of accountability and restraint, are being recognized as not merely figments of scientific imagination. During 1982 discussions on the need to establish a National Mineral Exploration Technology Development Program, an idea launched in 1979, expanded beyond the Federal-Provincial Geological Surveys arena, and involved industrial and academic groups. A Workshop on Exploration Technology Development held at the Prospectors and Developers Convention in March showed that there was strong support from many directions for a National Program. This was an important step towards the eventual rejuvenation of our activities as part of the new EMR Mineral Policy.

Highlights

This has not been a year in which large amounts of new work have been published. The most spectacular items were 7 new 1:1M Coloured Aeromagnetic Compilations of Central Canada, part of the new National Earth Science Series. The Division contributed 9 papers to the NEA/IEA Uranium Exploration Methods Symposium in Paris in June 1982, and the texts were published in September.

A considerable amount of data collection has been accomplished, including the completion of the Labrador aeromagnetic survey flying, and geochemical sampling over approximately 100,000 km^2 in Labrador and Ontario. The Georges Bank area SW of Nova Scotia was aeromagnetically surveyed to gather evidence pertaining to the boundary dispute with the U.S.A. Gamma-ray spectrometry was flown over the region north of Lake Superior to close the gap in existing coverage between east and west Canada, and possibly be of assistance to gold seekers in the Hemlo area. More detailed radiometric surveys took place in Newfoundland and Nova Scotia in support of Mineral Agreements. Magnetic gradiometer surveys were flown in the Lynn Lake and Flin Flon area of Manitoba, results from the latter being released before the year's end.

After several years when the division's involvement with CIDA projects seemed to be declining there have been actions during the fiscal year to indicate that there could be a repetition of the major commitments that occurred in the period 1975-78. Major projects were planned for both Zimbabwe and Thailand.

Personnel Notes

Dr. A. Larochelle, Assistant Director, remained on sick leave throughout the year.

Mr. G. Artichuk, Administrative Officer retired in March 1983, but continued, on a nominally part-time basis, to perform his duties as before.

Mr. C.C. Durham was assigned the duties of Acting Technical Operations Officer for the division, effective December 23, 1982.

Dr. E.J. Schwarz rejoined the division in December 1982 after a period in the wilderness with Precambrian Division and subsequently Ecole Polytechnique, Montreal.

Mr. P.H. McGrath was seconded to Precambrian Division from April 1982 to assist with the interpretation of geophysical data in support of geological mapping.

Attendance at Meetings, Conferences and Courses

A.G. Darnley
- KEGS/CGU Annual Meeting, Toronto, May 11, 1983.
- NEA/IAEA Uranium Exploration Methods Symposium, Paris, France, June 1-4, 1982.
- NEA/IAEA Uranium Exploration R&D Group, Paris, France, June 7-8, 1982.
- NEA Fuel Cycle Committee Meeting, Paris, September 6-8, 1982.
- Ontario Geoscience Forum, Toronto, December 8-9, 1982.
- GSC Current Research Forum, Ottawa, January 19-20, 1983.
- CIDA Technical Mission to Thailand, Bangkok, Thailand, January 30 - February 18, 1983.
- Prospectors and Developers Convention, Toronto, March 8-9, 1983.

B.E. Manistre
- GSC Workshop Ottawa. Display of airborne radiometric/magnetic maps from CIDA survey in Rwanda.
- Prospectors and Developers Assoc. Meeting, Toronto.

Special Talks and Lectures

A.G. Darnley
- "The proposed National Exploration Technology Development Program". Presented at: Ontario Mining Equipment Services for Export Meeting, Toronto, April 15, 1982; KEGS/CGU Meeting, Toronto, May 11, 1982; and Prospectors and Developers Association, Toronto, March 9, 1983.
- "Airborne gamma-ray spectrometry". Presented at Department of Mineral Resources Workshop, Bangkok, Thailand, February 8, 1983.

Memberships on Committees

A.G. Darnley
- Chairman, NEA/IAEA Uranium Exploration R&D Group.
- Chairman, Exploration Technology and Geoscience Standard, Subcommittee, National Geological Surveys Committee.
- Chairman, EMR Working Group on Mineral Exploration Technology.
- Member, Editorial Board Uranium Elsevier Amsterdam.
- Member, Comptroller-General's Working Group on R&D.
- Chairman, GSC Current Research Forum Organizing Committee.

Division Summary of New Information Released to the Public

43	Outside Publications	
12	Current Research Papers	
119	Aeromagnetic Maps Comprising:	
	Standard Series:	49 at 1:50,000
		4 at 1:250,000
		7 at 1:1,000,000
		47 at various scales
	Gradiometer Series:	12 at 1:50,000
8	Geophysical Series Gamma Ray Spectrometric Maps	
9	Open Files	
44	Oral Presentations	
7	Poster Sessions	
9	Abstracts	
25	Special Lectures	

CIDA Advisory and Training Program

B.E. Manistre

General

The provision of technical advice on CIDA projects continued at about the same level as in 1981/82. Administrative and procedural changes within CIDA have resulted in requests for separate agreements to cover

technical consulting on each CIDA project involved, based on terms of reference and cost estimates, rather than setting up broad financial encumbrances as provided by the EMR/CIDA Memorandum of Understanding.

Two such agreements have been signed to cover GSC assistance for projects in Zimbabwe and Thailand.

Brasil

The possibility of establishing a new co-operative program with Brasil, (funded by CIDA), was again raised during the year. The new concept involved various Departments acting as executing agencies for CIDA, but following CIDA's administrative procedures rather than their own. In the mineral field, four projects were suggested by Brasil, all of which involved training of Brasilians in Canada with reciprocal attachments of Canadians in Brasil to give lectures and advice. As these projects would require considerable administrative and logistical effort, and would be subject to CIDA's procedures and evaluation, they have not been considered practical at GSC.

Zimbabwe

The CIDA program for Zimbabwe includes an airborne magnetic survey of approximately 100,000 line km; airborne electromagnetic, (input), surveys of four small areas, designed to evaluate existing high potential situations; the interpretation of landsat imagery; and the provision of equipment for ground investigations, and exploratory drilling.

At CIDA's request, assistance was given in formulating the Plan of Operations. Dr. P.J. Hood and the Contract Surveys Section produced the technical specifications for the airborne magnetic survey and participated in the evaluation of the proposals submitted to DSS for carrying out the survey. An agreement with CIDA includes the inspection and monitoring of the contractor by GSC.

Mr. L.S. Collett assisted in reviewing the technical specifications and evaluating the subsequent proposals received for the electromagnetic (input) surveys.

Thailand

A program to develop, systematically, the mineral resources of Thailand was formulated during 1982, by the Asia Development Bank, consisting of airborne geophysical surveys, supported by equipment purchases, consulting and training services and infrastructure development. In August 1982 Mr. B.E. Manistre joined a CIDA mission to Bangkok designed to see whether CIDA could contribute to part of the program. It was agreed with the ADB that CIDA should finance the consulting and training aspects. It was also realized that the procedures for setting up both the ADB and CIDA financial aspects would take some time, and that technical specifications would be needed prior to approval of financing, if the airborne geophysical surveys were to begin in the 1983 flying season.

Draft specifications were therefore prepared at GSC and taken to Bangkok and Manila by a mission composed of Dr. A.G. Darnley, Dr. P.J. Hood and Mr. B.E. Manistre. Following discussions at the Department of Mineral Resources, Bangkok, and the ADB the specifications were incorporated in draft tender documents following ADB procurement procedures. The possibility of providing inspection and monitoring for these survey contracts is envisaged in the future.

Training

Three geologists from the Department of Mineral Resources, Thailand, were attached to RGG Division from August to November 1982. Financing of the attachments was arranged by organizing a small project with CIDA which also covered three further trainees attached to CCRS. The GSC trainees were supervised by Dr. R.G. Garrett for Geochemistry, Dr. P.J. Hood for Geophysics and Mr. B.E. Manistre for data handling systems. Assistance was also provided by Economic Geology Division in the fields of mathematical geology and the CANMINDEX. The objective of these attachments was to begin training which would be useful in connection with the overall mineral development project for Thailand.

Maria Oguino from Brasil was attached for one month to Economic Geology Division for training in geoscience data handling.

At the request of the Department of Industry, Trade and Commerce a senior mining mission from India visited GSC (June 1982) and discussed geophysical equipment purchase, and possible training at GSC for officers of G.S.I., in cartography, data processing and marine geology. Subsequently Dr. P.J. Hood visited the G.S.I. to advise on selection of an airborne electromagnetic survey aircraft and instrumentation system.

Dr. J. Sunday Ojo (Nigeria) was attached to R.G.G. Division for six months training, under an IAEA fellowship, under the supervision of Dr. K.A. Richardson.

REGIONAL GEOPHYSICS SUBDIVISION

P.J. Hood

The primary objective of the Regional Geophysics Subdivision is to improve the understanding of the geological framework of Canada and to facilitate mineral exploration and development programs by providing a regional framework of basic geophysical data. Emphasis is placed upon magnetic

Table 1.

Contract Aeromagnetic Surveys, 1982-83

Contract	G.S.C. Project	Kilometres Flown 1982	Maps Published in 1982/83	
			1:50,000	1:250,000
Labrador	690072	---	29	4
Labrador	810002	42,215 l/kms	20	---
Georges Bank	303030	80,595 l/kms	---	---

methods. The Subdivision develops new survey instrumentation and techniques, conducts experimental surveys, devises new techniques for the computer treatment, presentation and interpretation of resultant data, prepares specifications for surveys carried out under contract, monitors their execution, and supervises the publication of results. Geological interpretations of other results are provided to the extent possible with available staff.

The Regional Geophysics Subdivision consists of four sections: Contract Aeromagnetic Surveys, Experimental Airborne Operations, Geophysical Data Processing and Magnetic Geophysical Interpretation.

Highlights

In 1982, aeromagnetic gradiometer/VLF electromagnetic surveys were carried out in the Lynn Lake and McLarty Lake areas of Manitoba to assist the mineral exploration programs in the area; the Lynn Lake mine has closed down because of the mining out of the orebody. Because of high diurnal activity, these surveys were executed without regard to diurnal specifications being met because the total field information can be calculated from the vertical gradient data. Field productivity was thereby considerably increased. In addition an aeromagnetic gradiometer/VLF EM survey was executed in the Guysborough County area of eastern Nova Scotia as a contribution to the Canada-Nova Scotia Cooperative Mineral Program.

The transfer of the aeromagnetic gradiometer technology from GSC to Kenting Earth Sciences Ltd. proceeded throughout 1982 and will permit the company to offer contracted gradiometer services in 1983. Such services will help maintain the competitive advantage of Canadian airborne geophysical survey companies over their foreign competitors.

The aeromagnetic survey flying of northern Labrador was completed in 1982 so that the whole of Newfoundland-Labrador has been aeromagnetically surveyed fulfilling one of the terms of the entry by Newfoundland into Confederation in 1949. The aeromagnetic data will be compiled and issued during 1983. A contracted aeromagnetic survey of the Georges Bank area west of Nova Scotia was completed in 1982 to provide basic geoscience data for the boundary dispute presently before the International Court at The Hague.

Seven coloured 1:1 M magnetic anomaly maps in the new National Earth Science Series covering a large area of central Canada were issued. A new technique of shading the magnetic anomaly maps has been devised that presents the data in a format similar to that for side-looking radar or low sun angle photography; the maps are therefore called shaded relief maps. In this way a great deal more structural geological information is brought out.

Contract Aeromagnetic Surveys

The status of contract aeromagnetic surveys is summarized in Table 1.

The aeromagnetic survey of northern Labrador and the Labrador continental margin continued during 1982-83. Contractor: Kenting Earth Sciences Ltd., Project Leader: W.A. Knappers. 42,215.5 line km were surveyed, completing the project total of 82,000 l/km. The field operations were carried out by Kenting Earth Sciences Ltd. from Kuujjuaq and Saglek utilizing 2 aircraft: C-GJEM June 26 to August 16, C-FFRY July 21 to August 25. One inspection trip to Kuujjuaq was carried out by the Project Leader from July 18 to July 23. A Nordair strike prevented an additional inspection trip. A field inspection report was submitted. Compilation of the remaining 59 1:50,000 maps (total 102 maps) is being carried out by the Contractor at his main office. To date 20 1:50,000 maps have been printed and were published 30 December, 1982.

Specifications and the Request for Proposal documents were prepared for an airborne magnetometer survey in Zimbabwe, under the auspices of the Canadian International Development Agency, prior to being issued by D.S.S.

Section personnel also assisted Division Management in the planning and estimating for a proposed airborne geophysical survey to be carried out in Thailand sponsored by the Asia Development Bank.

As the Contract Aeromagnetic Surveys Section provides the management and the only continuity for the storage and retrieval of CIDA sponsored airborne geophysical survey data for certain foreign countries, this Section again provided space and consultation services to those interested in bidding on the interpretation of the Liptako-Gourma project covering portions of Niger, Upper Volta and Mali. These data, maps and stacked profiles were sorted and prepared for shipping directly from our offices, after receiving approval from CIDA.

A contract was awarded to Kenting Earth Sciences Ltd. in mid-March, 1982 for a digitally recorded aeromagnetic survey of the Georges Bank-Western Scotian Shelf area totalling 80,595 line kilometres. The field operations commenced on April 15 and were completed by the end of May, 1982. Two on-site field inspections were carried out, one at Yarmouth and one at Halifax, N.S. as well as two meetings with AGC personnel in connection with the above project.

Thirteen (13) total field contour maps at the scale of 1:250,000 and a 1:1,000,000 contour map of the entire area were produced. These maps have not yet been issued as the geophysical information is considered pertinent to the preparation of Canada's legal case in the Gulf of Maine maritime boundary dispute now before the International Court of Justice. In addition, coloured magnetic anomaly maps (I.G.R.F. removed) for each of the 13 1:250,000 sheets are now being produced by Data Plotting Services Ltd. as well as a coloured 1:1,000,000 magnetic anomaly map of the entire survey area.

Approximately 1,000 stable copies of aeromagnetic maps at the scale of 1:50,000 or 1:63,360 were provided from our storage to the Digital Data Processing Section as an aid to the preparation and production of the 1:1,000,000 anomaly map series. These 1,000 positives have since been returned and filed by personnel from this section.

Seven (7) requests for the loan of original geophysical data from mining and oil companies were processed during the year.

Sixteen (16) aeromagnetic composite maps at the scale of 1:250,000 covering parts of Saskatchewan, Alberta and British Columbia were compiled. These composite maps were derived from previously published one-mile maps which had not yet been issued at the scale of 1:250,000. These 16 maps were sent to Surveys and Mapping Branch for printing.

Ocean Aeromagnetics Project

The GSC/NAE joint aeromagnetic project continued in 1982-83 with flying operations in the high Arctic. The reconnaissance survey of the Ellesmere Shelf was completed; this area is magnetically active except toward the east side, which seem to be an extension of the Fram Basin. Twenty lines were flown across Kane Basin, completing the picture there except for a discontinuity at 70° 30'W, which will require further lines in 1983. Lines flown across Nares Strait from the Arctic Ocean to Kane Basin revealed a line of anomalies which may indicate seafloor spreading. Track recovery, profile plots and some digital filtering have been done for all these areas. Usually the GNS-500 VLF navigation positions were the most accurate.

The Convair aircraft was grounded for several months for installation of a new nose assembly to accommodate the synthetic aperture radar. This curtailed the local flying program, but some gradiometer work was done and flight tests were started for the Internav LC1200 Loran C (a PILP project supported in part by GSC). A ground station data link is now in operation; data is transmitted via HF radio and recorded on magnetic tape along with the airborne data. Extensive modifications have been made to the aircraft data acquisition system, particularly in the areas of magnetic compensation, navigation data for the Kalman filter, and displays to the navigator and pilots. A laboratory version of the aircraft system is being used extensively for debugging new programs for the aircraft.

Magnetic Anomaly Map Project

Seven 1:1,000,000 coloured magnetic anomaly maps, namely, NQ-12/13/14-AM, NP-17/18-AM, NO-15-AM, NO-16-AM, NO-18-AM, NK/NL-20-AM, were issued in January 1983. This brings the total published to date to eleven.

Approximately 2,000,000 square kilometers of aeromagnetic data were digitized under contract from existing 1:63,360 or 1:50,000 aeromagnetic maps during FY 82/83.

The compilation of a fourth edition of the 1:5,000,000 Anomaly Map of Canada, comprising approximately 25 percent more coverage, has been completed and the manuscript has been submitted to drafting for final printing preparations.

One of the major accomplishments of the year was the development of shaded relief or 'shadowgram' techniques to the 1:1,000,00 magnetic anomaly maps using the Applicon plotter. These techniques have been shown to be extremely useful for the presentation of fine detail such as dykes which would not be seen on the magnetic anomaly maps because of their low amplitude.

Queenair Aeromagnetic Gradiometer Project

In 1974 the GSC-owned Queenair aircraft was fitted with fixed twin tail stingers that made it possible to obtain reliable vertical magnetic gradient data. The struts and other supports required for the installation created a considerable amount of drag. So much, in fact, that the single engine service ceiling extended to only about 1000 metres above sea level.

In the spring of 1982, Aass Aero Engineering was approached to design, build, install, test fly and obtain the proper documentation for a tuning fork-shaped dual stinger installation that is attached to the rear of the aircraft fuselage.

This dual stinger is much cleaner aerodynamically and the design calculations indicate that the drag for this system should be much less than that for the original system. This new stinger is rotated into the horizontal position for landings and take off and into the vertical position for surveying.

One immediate advantage for this new system will be that it will no longer be necessary to use ladders and tall stands to get at the instruments located in the booms. The boom system can be rotated so that either boom will be only about one metre from the ground, thus making it very easy to service the magnetometer systems that are installed in the booms.

Another capability for this new system will be that it will permit the operation of the gradiometer system in the horizontal position so that the advantages of measuring the transverse horizontal gradient can be evaluated.

The 1982 field season for the Queenair aircraft was delayed by more than a month due to trouble with the electrically operated undercarriage retraction system. To avoid the possibility of a similar occurrence, a hydraulically operated system has been installed that should eliminate further problems. This delay, coupled with extremely high diurnal activity, which delayed the work in Manitoba, prevented the completion of the work in the Maritimes that had been undertaken for the 1982 survey season.

Kenting Earth Sciences Ltd. of Ottawa which was awarded a contract by the Ontario Geological Survey in 1981 to build a commercial aeromagnetic gradiometer system had almost completed their development by the end of FY 82/83. Personnel in the Experimental Airborne Operations Section assisted in the development throughout the year and Kenting will be able to offer contracted aeromagnetic gradiometer services in 1983.

Considerable progress was made in the design and construction of a new microprocessor data acquisition system. The chassis was delivered last fall. Several electronic cards have been built and made to work according to the design specifications. A summer student Piere Luigi Bortot, helped this project during the summer of 1982 and did excellent work.

A new dual frequency VLF system, the Totem 2A manufactured by Herz Industries, was flown during the last survey season and performed well.

Experimental high resolution gradiometer and VLF electromagnetometer surveys were carried out in the following areas during the 1982 field season:-

	NTS #	Line km
McLarty Lake, Manitoba	63K/8,9,10; 63J/5,12	11,737
Lynn Lake, Manitoba	64C/10,11,14,15	3,852
Guysborough, Nova Scotia	11E/1,8;11D/16	9,786
	TOTAL	25,375

A large percentage of the flying was done during periods of high diurnal activity necessitating that the total field information be calculated from the vertical gradient data. Had this not been resorted to, very little survey production could have been achieved. It was a good test for the gradiometer system, since according to theory, diurnal activity should not affect the quality of the vertical gradient data.

Statistics for the compilation of high resolution aeromagnetic gradiometer surveys are given in Table 2.

An Apple II computer has been acquired to assist in magnetic interpretation modelling of the aeromagnetic gradiometer data. There is a need for the development of simple straightforward iterative techniques that can be readily applied. In addition L.J. Kornik has prepared several sets of derived magnetic maps for the Radwaste Program which emphasize the major fractures. L.J. Kornik also co-supervised the Carleton University B.Sc. Geophysics thesis of Philip Gregory entitled "Structural and geological interpretation of the Meguma belt in central Nova Scotia."

Table 2.

Publication Statistics

Maps Published

Area & Prov.	Client	Scale	Total Field	Vert. Grad.	Total
Yarmouth,NS	NS Dept. of Mines & Energy	1:50,000 Colour, with Geology	1	1	2
			2	2	4
Halifax,NS			3	3	6
Antigonish,NS			4	-	-
		TOTAL	6	6	12

Maps Open-Filed

Open File	Area & Prov.	Release Date	Scale	Total Field	Vert. Grad.
889	Lynn Lake, Man.	22/12/82	1:25,000		6
			1:50,000 Colour		1
879	Caviar Lake, Ont.	27/11/82	1:25,000	4	4
			1:50,000 Colour	1	1
879	East Bull Lake, Ont.	27/11/82	1:25,000	2	2
			1:50,000 Colour	1	1
876	Sherridon/ Heming, Man.	27/10/82	1:20,000	4	4
877	Cormorant, Man.	27/10/82	1:20,000	8	8
			Sub-Total	20	27

TOTAL = 47

Personnel

P.H. McGrath - was seconded to the Precambrian Subdivision as a team member on integrated projects.

E.J. Schwarz - joined the Subdivision in 1982.

Attendance at Meetings, Conferences and Courses

K.W. Anderson - Introduction to FORTRAN Course at the Computer Science Centre, EMR.

I. Butt - Evaluation of EDP Systems Course, PSC.

- GSC Current Activities Forum, Ottawa, January 1983.

A. Dicaire - Computer Systems Fundamentals Course, Ottawa, February 21-25, 1983.

S.D. Dods - Computer Communications Concepts and Application Course, PSC.

P.J. Hood - 1982 National Convention, Canadian Society of Exploration Geophysicists, Calgary, April 5-7, 1982.

Presented a paper entitled "Aeromagnetic gradiometer surveying: a status report" with S.D. Dods, L.J. Kornik, D. Olson, P. Sawatzky and D. Teskey as co-authors.

- 9th Annual Meeting, Canadian Geophysical Union, Toronto, May 10-12.

J.L. Irvine presented a paper entitled "Aeromagnetic gradiometer technique and gold exploration" with P.J. Hood and J.E. Hansen.

- 52nd Annual Meeting, Society of Exploration Geophysicists, Dallas, October 17-21, 1982.

Presented a paper entitled "Evolution of GSC magnetic anomaly maps: a Canadian perspective" with P.H. McGrath and D.J. Teskey as co-authors.

- GSC Activities Forum, Skyline Hotel, Ottawa, January 20, 1983.

Presented a paper entitled "The application of the aeromagnetic gradiometer survey technique to gold exploration in the Val D'Or mining camp" with J.L. Irvine and J.E. Hansen as co-authors.

J. Janveau
- Basic for Minis and Micros Course, CSC, EMR.
- Introduction to Graphics Course, CSC, EMR.

W.A. Knappers
- Computer Systems Fundamentals Course, Ottawa, February 21-25, 1983.

L.J. Kornik
- Uranium Exploration Methods Symposium, Paris, June 1982.

Presented paper entitled "Aeromagnetic gradiometer results in the Wollaston Lake area, Saskatchewan, Canada".

- Mineral Resources Division of Manitoba, Annual Meeting (Open House), Winnipeg, November 18.

L.D. Lawley
- GSC Current Activities Forum, Ottawa, January 1983.

D. Olson
- Project Management Course, Ottawa, December 13-17, 1982.

E.E. Ready
- Computer Systems Fundamentals Course, Ottawa, February 21-25, 1983.

D.A. Reveler
- Computer Systems Fundamentals Course, Ottawa, February 21-25, 1983.

P. Sawatzky
- Computer Systems Fundamentals Course, Ottawa, February 21-25, 1983.

D.J. Teskey
- 52nd Annual Meeting, Society of Exploration Geophysicists, Dallas, October 17-21, 1982.

Presented two papers: (1) "The new 1:1,000,000 magnetic anomaly map series of the Geological Survey of Canada: compilation techniques and interpretation" with S.D. Dods and P.J. Hood; (2) "Techniques for modelling complex deep source of observed magnetic anomalies with constraints".

- Geoscience Forum, Yellowknife, December 1982.

Presented a paper entitled "Compilation, enhancement and interpretation techniques for the new 1:1,000,000 magnetic anomaly map series of the GSC" with S.D. Dods and P.J. Hood.

Same paper was also presented at the GSC Activities Forum in Ottawa on January 20, 1983.

- Systems Analysis and Design Course, Public Service Commission, Hull, March 21-25, 1983.

Special Talks and Lectures

P.J. Hood
- "Review of aeromagnetic survey techniques" to Department of Mineral Resources, Bangkok,

Thailand, February 8, 1983.

- "Modern exploration techniques in Canada" to Geophysics Division, Geological Survey of India, Calcutta, February 15, 1983.

- "Advancement in geophysical exploration" to New Delhi Branch, Mining, Geological and Metallurgical Institute of India, New Delhi, February 18, 1983.

Membership on Committees

K.W. Anderson - Division Representative, GSC Current Activities Forum, Skyline Hotel, Ottawa, Ontario, January 1983.

S.D. Dods - Member, Data Display Users Group, Computer Sciences Centre.

P.J. Hood - Co-chairman, Map Compilation Committee, Magnetic Anomaly Map of North America, Society of Exploration Geophysicists.

- Co-chairman, Working Group I-4, Division 1 (Magnetic Anomalies Land and Sea), International Association of Geomagnetism and Aeronomy.

- Member, Technical Subcommittee for Development of Commercial Aeromagnetic Gradiometer System, Minerals Committee, Eastern Ontario Subsidiary Agreement.

P.H. McGrath - Arctic Group, North American Continent, Ocean Transects Program.

D.J. Teskey - Digital Compilation Subcommittee, Gravity and Magnetic Anomaly Maps of North America, Society of Exploration Geophysicists.

Subdivision Productivity

119 Aeromagnetic Maps:
Standard Series: 49 at 1:50,000
4 at 1:250,000
7 at 1:1,000,000
Gradiometer Series: 12 at 1:50,000

2 Outside Publications
1 Current Research
4 Open File Releases -
47 aeromagnetic maps at various scales
13 Oral Presentations

RESOURCE GEOCHEMISTRY SUBDIVISION

E.H.W. Hornbrook

The objective of this Subdivision is to undertake research, develop, apply and evaluate methods of geochemical exploration for a variety of purposes; systematic data are gathered from a variety of sampling media and analytical techniques in order to assist the mineral exploration industry, government assessment of resources, and general geological mapping. Many of the data are also relevant to topical environmental and health problems. These data gathering activities are complemented by research on geochemical processes; by development of new methods of mineral exploration and resource appraisal; by study of new analytical techniques and geochemical instrumentation; and by software development to facilitate interpretation.

Highlights

National Geochemical Reconnaissance (NGR) surveys in 1982-83 were carried out in Newfoundland (Labrador) and Ontario.

The 1982 phase of the two-year Labrador NGR lake sediment and water survey under the Federal-Mineral Program in Newfoundland sampled approximately one-half the survey area (53,000 km^2). A joint EMR-Newfoundland open file of maps and field and analytical results of the first year is scheduled for a 1983 release.

An environmentally oriented NGR lake sediment and water survey of a 41,600 km^2 area of southern Ontario was completed this summer. This survey data is expected to provide a comprehensive data base together with related till and bedrock data for problem solving and new study area selection to further investigate environmental processes - pollution, contamination, acid rain impact etc.

The heavy involvement of Subdivision staff in Nahanni and Athabasca IMPP studies of previous years is virtually completed. A special GSC-SGS volume of Athabasca papers, edited by Dr. E.M. Cameron, is in the final stages of editing and much of the Nahanni results are now being published and will later be incorporated into a memoir level of publication.

The genetic model developed by S.B. Ballantyne to describe the radioelement content of the Surprise Lake batholith, Atlin area, British Columbia was used to investigate the Sn, W, Be and Mo potential of this granite complex and associated skarns. Discovery of new Sn-W-Be-F-As mineralization provided evidence that the "specialized" list of trace elements used in the lithogeochemical studies can assist in defining the magmatic and post magmatic meteoric fluid convection cell hydrothermal processes that are operative within a highly evolved granitoid of the Sn-F type. Results have strong implications for genetic studies and exploration for lithophile metal ore deposits.

Dr. D.R. Boyle has begun the study of the applications of groundwaters in mineral and hydrocarbon exploration and their role in the formation of infiltration type mineral deposits with the acquisition and testing of down-hole sampling equipment and probes.

Dr. R.W. Boyle's publication on geochemical methods of exploration for blind mineral deposits fills a significant need because of industry's focus on this particular problem in exploration. He has also published on geochemical prospecting methods for thorium and uranium and with, Dr. I.R. Jonasson, has completed a paper on the use of antimony as an indicator element in geochemical prospecting utilizing primary and secondary halos.

Mr. W. Dyck's joint GSC-INCO geochemical survey in the Baker Lake area, N.W.T. has revealed, by highly anomalous He levels in the lake bottom water and sediments, a major fracture-like system through which mineralized groundwaters have entered the lake. Anomalous U and Rn contents were found in the lake increasing the potential for the existence of deeply buried uranium mineralization. Lakes in permafrost windows are responsive to geochemical exploration and are particularly interesting when evidence of a fracture-like system is found.

Mr. D.J. Ellwood has developed a coloured graphics capability for the display for three elements on one map where two selected elements are shown via symbols representing percentiles on a solid regional display of the third element.

Dr. R.G. Garrett has completed his work on the detection of outlier samples using multi-element data simultaneously which has led to an improved ability to carry out studies using regression analysis methods. Dr. Garrett's training of a geochemist from the Thailand Department of Mineral Resources was satisfactorily completed with the unexpected benefit of an identification of an area possibly containing a type of lead mineralization not previously recognized in Thailand.

Dr. W.D. Goodfellow has published an account of the environmental evolution of the Selwyn Basin (Nahanni IMPP) as discerned from the sulphur isotope composition of pyrite and barite and a description of the lateral and stratigraphic zonation of chalcophile elements about the Howard's Pass (XY) stratibound Zn-Pb deposit.

Research and development of analytical methods by Ms. G.E.M. Hall and staff continued with the establishment of routine methods to determine F, Cl, and S in solid samples. Analytical reports can now be generated in-house on a working network of data transfer from four laboratory instrument sites each having a micro-computer to a central mini-computer.

Using the developed Geochemical Information Service System (GISS) Mr. N.G. Lund and staff have organized all NGR data by NTS sheet into 116 files of data and appropriate documentation.

Mr. J.J. Lynch and staff have completed the preparation and bottling of four lake and four stream sediment international reference samples and homogeneity tests are in progress. For routine in-house use, three solid and seven water reference standards were prepared. Mr. Lynch also prepared and secured six contracts with commercial firms for sample preparation and analytical services through Supply and Services, Canada.

Dr. Y.T. Maurice has carried out sampling of the dewatered lake sediment beds of Key, Seahorse and Hourglass Lakes in northern Saskatchewan which will provide the GSC's first opportunity to study anomalous lake sediments in a three dimensional framework.

Personnel Notes

Conrad Gregoire, formerly with Revenue Canada, Customs and Excise, joined the Subdivision June 14, 1982 to take up a position as a research chemist in the Analytical Laboratories Section.

Judy McKeen joined the Subdivision on November 22, 1982 as an analyst in the Analytical Laboratories Section.

Sample Preparation Laboratory - GSC

28,790 separate operations were carried out in the sample preparation laboratory on approximately 3,500 samples.

Samples Split	4,775
Crushing/Grinding	4,975
Sieving	6,750
Ball Milling	5,850
Super Panner	600
Frantz	1,100
Heavy Liquid Separations	1,300

Flotation	1,000
Mineral Identification	2,400
TOTAL	28,790

Trace Element Laboratory - GSC

Approximately 4,300 samples were analyzed for a total of 71,000 determinations.

Water Samples Analyzed	3,316
Total Determinations on Water Samples	59,835
Rock, Ores, Sediments, Soils Analyzed	1,027
Total Determinations on Solid Samples	10,924

In addition, 282 shales were extracted for their pyrite and/or barite contents resulting in 448 Ag_2S samples for $\delta^{34}S$ estimation.

Contract Analytical Support Service

Samples Sent to Contractors	23,000
Total Determinations Carried Out	250,000

Contract Archiving of NGR-URP Material

Total Number of Lake and Stream Sediment Ball Milled, Sieved,	12,000

Attendance at Meetings, Conferences and Courses

S.B. Ballantyne - Geological Survey of Canada Current Activities Forum, Ottawa, January 1983.

D.R. Boyle - Penrose Workshop on Hydrodynamics and Geochemistry of Ore Generation in Sedimentary Environments, Missouri, U.S.A., May 1982.

R.W. Boyle - International Association on the Genesis of Ore Deposits, Tiblisi, U.S.S.R., September 1982.

- GSA-SEG Annual Meeting, New Orleans, U.S.A., October 1982.

E.M. Cameron - 9th IGES Saskatoon, Saskatchewan, May 1982.

- NEA/IAEA Uranium Exploration Methods Symposium, Paris, France, June 1982.

W. Dyck - NEA/IAEA Uranium Exploration Methods Symposium, Paris, France, June 1982.

D.J. Ellwood - Geological Survey of Canada Current Activities Forum, January 1983.

R.G. Garrett - 9th IGES Saskatoon, Saskatchewan, May 1982.

- Interface XV, Troy, New York, July, 1982.

- Annual Meeting of the ASA Cincinnati, Ohio, August 1982.

- Workshop Group on Exploration Data and Interpretation (COGEODATA) Meeting, Sophia Antipolis, France, October 1982.

- AIME/AEG joint session at the 112 AIME Annual Meeting on Geochemistry Applied to Today's Exploration, Atlanta, Georgia, March 1983.

W.D. Goodfellow - 9th IGES Saskatoon, Saskatchewan, May 1982.

- International Association on the Genesis of Ore Deposits, Tiblisi, U.S.S.R., September 1982.

- International Association of Sedimentology, Hamilton, Ontario, August 1982.

- Geoscience Forum, Whitehorse, Y.T., December 1982.

- Geological Survey of Canada Current Activities Forum, January 1983.

C. Gregoire - Geological Survey of Canada Current Activities Forum, Ottawa, January 1983.

G.E.M. Hall - 29th Annual Conference of the Spectroscopy Society of Canada, Grey Rocks, Quebec, September 1982.

- Geological Survey of Canada Current Activities Forum, January 1983.

J.J. Lynch - 9th IGES Saskatoon, Saskatchewan, May 1982.

Y.T. Maurice - 9th IGES Saskatoon, Saskatchewan, May 1982.

- NEA/IAEA Uranium Exploration Methods Symposium, Paris, France, June 1982.

- Seminaire d'information sur les activites de la direction generale de l'exploration geologique et minerals du Ministere de l'energie et des ressources, Quebec Cité, Quebec, Novembre 1982.

Special Talks and Lectures

S.B. Ballantyne - Tin-tungsten geochemical multi-media investigations: A case history, Surprise Lake batholith, British Columbia, Poster Session, GSC Current Activities Forum, January 1983.

D.R. Boyle - Groundwater infiltration type uranium deposits associated with granitic and metamorphic basement complexes, Penrose Workshop, Missouri, May 1982.

R.W. Boyle - Lecture series on geochemical prospecting for gold at the Companhia Baiana de Pesquisa Mineral, Salvador and University of Salvador, Salvador, Brasil, July-August, 1982.

- Lecture series on gold deposits given at the University of Zimbabwe, Harare and University of Witwatersrand, Joburg, South Africa, May-June 1982.

- Lecture on geochemistry of thorium and uranium, University of Ottawa, March 1983.

E.M. Cameron - Sulphur cycle in early Precambrian oceans, GSC Current Activities Forum, January 1983.

- A review of exploration research and development projects in the NEA/IAEA Athabasca test basin area, Saskatchewan, NEA/IAEA Athabasca test basin area, Saskatchewan, NEA/IAEA Symposium, Paris, France, June 1982.

W. Dyck - Radon and helium surveys of the Midwest and McClean uranium deposit environments, northern Saskatchewan, NEA/IAEA Symposium, Paris, France, June 1982.

- Hydrogeochemical investigations of the Midwest and McClean uranium deposit environments and Secondary dispersion around the uranium deposits at Key Lake, Poster Sessions, 9th IGES, Saskatoon, Saskatchewan, May 1982.

D.J. Ellwood - Tin-tungsten geochemical multi-media investigations: A case history, Surprise Lake batholith, British Columbia, GSC Current Activities Forum, January 1983.

R.G. Garrett - Multivariate outlier detection - An application to robust regression in the earth sciences, Poster Session, ASA Annual Meeting, Cincinnati, Ohio, August 1982.

- Current technology in the presentation of geochemical data, AIME/AEG Atlanta, Georgia, March 1983.

- Four day short course on exploration geochemistry given at Montanuniversitat, Leoben, Austria for UNESCO and the International Institute for Resource Development.

W.D. Goodfellow - Zonation of chalcophile elements about the Howard's Pass (XY) stratabound Zn-Pb deposit, Selwyn Basin, Yukon, Canada, 9th IGES Saskatoon, Saskatchewan, May 1982.

- Phosphatic Carbonaceous chert overlying the Howard's Pass (XY) stratabound Zn-Pb deposit, Selwyn Basin, Yukon, Canada, IAS, Hamilton, August 1982.

- Geochemistry of rocks hosting the Howard's Pass

(XY) stratabound Zn-Pb deposit, Selwyn Basin, Yukon, Canada, IAGOD Symposium, Tiblisi, U.S.S.R., September, 1982.

- Wall-rock alteration associated with the Brunswick No. 12 Zn-Pb-Cu volcanogenic massive sulphide deposit, New Brunswick, Canada, IAGOD Symposium, Tiblisi, U.S.S.R., August 1982.

- Regional geochemistry of the Nahanni Map-area and the Geology, Geochemistry and origin of the Howard's Pass (XY) Zn-Pb deposit, Geoscience Forum, Whitehorse, Yukon, December 1982.

- Regional geochemistry of the Nahanni map area: Interpretation of results and implications for exploration, GSC Current Activities Forum, Ottawa, January 1983.

C. Gregoire
- Technology transfer featuring the Scintrex AAZ-2, Poster Session, GSC Current Activities Forum, Ottawa, January 1983.

G.E.M. Hall
- Technology transfer featuring the Scintrex AAZ-2, Poster Session, GSC Current Activities Forum, January 1983.

I.R. Jonasson
- A total of 11 lectures on sediment hosted Zn-Pb-Ba deposits of the Selwyn Basin, Yukon, Canada were given at: University of Melbourne, Australia (1) and South Africa (10).

Y.T. Maurice
- Regional gamma ray spectrometry applied to uranium exploration in granitic terrain, NEA/IAEA Symposium, Paris, France, June 1982.

- Interpretation of secondary dispersion patterns at Key Lake, Northern Saskatchewan, Poster Session, 9th IGES Saskatoon, Saskatchewan, May 1982.

- Recognition of uranium concentration processes in granites and related rocks using airborne radiometric measurements, Poster Session, GSC Current Activities Forum, January 1983.

- Ten lectures on exploration geochemistry at Universite du Quebec a Chicoutimi, Quebec, September-November 1982.

- Lecture on the Key Lake U-Ni deposits in Northern Saskatchewan, University of Ottawa, March 1983.

Membership on Committees

D.R. Boyle
- Member, IAEA Working Group II on Sandstone Type Uranium Deposits.

- Member, IAEA Working Group IV on Surficial Uranium deposits.

R.W. Boyle
- Councillor, Society Economic Geologists.

- Series Editor, Benchmark Series on Economic Geology, SEG.

- Editorial Board, Chemical Geology, Elsevier, Amsterdam.

- Editorial and Research Board, Colorado School of Mines Quarterly.

- Convenor, SEG Symposium, Primary Dispersion Halos and their Exploration Significance, Los Angeles, California, February 26- March 2, 1984.

E.M. Cameron
- Editor-in-Chief, Journal of Geochemical Exploration.

- Co-Chairman, NEA/IAEA Athabasca Test Basin Area, Saskatchewan.

- Member, IGCP Project 157.

W. Dyck
- Member, IAEA Working Group III, Gases in Uranium Exploration.

D.J. Ellwood
- Member, Departmental Computer Working Committee.

- Member, Physical Scientists Executive.

R.G. Garrett	- Member, Departmental Computer Policy Committee.
	- Branch Representative, to Departmental MSAT (Satellite Communications) Committee.
	- Member, Branch Management Standing Subcommittee on New Technology for Data and Information Acquisition and Processing.
	- Vice-President, Association of Exploration Geochemists.
	- Member, COGEODATA Working Group on Exploration Data and Interpretation.
	- Member, Editorial Board, UNESCO Publication; Collection and Analysis of Mineral Resources Data.
W.D. Goodfellow	- Councillor, Association of Exploration Geochemists.
E.H. Hornbrook	- Member, IAEA Working Group VIII, Biogeochemical Exploration for Uranium.
	- Councillor, Association of Exploration geochemists.
I.R. Jonasson	- Adjunct Professor, Carleton University.
	- Member, Research Scientists Executive.
Y.T. Maurice	- Member, IAEA Working Group VI, Uranium in Granites.

Subdivision Productivity

28	Outside Publications
5	Current Research Papers
4	Open Files
10	Oral Presentations
7	Poster Sessions
9	Abstracts
25	Special Lectures

RESOURCE GEOPHYSICS SUBDIVISION

K.A. Richardson

The objectives of this Subdivision are directed toward the development, application and evaluation of radiometric, electrical and seismic methods of geophysics for mineral exploration, geological mapping and engineering geology. Research and development in instrumentation and geophysical exploration techniques are conducted in airborne, surface, borehole and marine environments.

The Subdivision develops new instrumentation inhouse and in cooperation with industry, devises new techniques for more efficient handling of field data. Experimental surveys are conducted to demonstrate new developments and their application. Calibration facilities are maintained for use by industry, academic and government agencies; advice is provided to users of the facilities in order to improve the standardization of measurements.

Highlights

The Skyvan had a productive survey season in 1982; began on June 2 and ended on October 29, when Nova Scotia surveys were completed -- too late to start the planned New Brunswick survey. The Newfoundland and Nova Scotia surveys took somewhat longer than expected because the newly installed Skyvan VLF system required a significant number of reflights, in order to get fairly complete VLF coverage. These were our first test surveys with VLF.

Detailed Skyvan gamma-ray surveys were flown under EMR - Provincial agreements in southern Nova Scotia and southern Newfoundland. The results compiled for the Newfoundland survey show considerable compositional differences exist within granites previously mapped as homogeneous. This information is of significance with respect to mineralization potential.

A reconnaissance gamma-ray survey, was flown north of Lake Superior, to fillin between existing blocks of URP data. This survey, maps from which will be released during the early summer of 1983, includes coverage of the Hemlo area which is currently the scene of much gold exploration.

Surveys of Chalk River, and Douglas Point-Bruce nuclear reactor sites (flown on behalf of Health and Welfare Canada) delineated the extent of the downwind argon-41 plumes.

A successful snow-water depth survey of the Lake Superior Basin was flown in March, 1983, as part of an international program involving Environment Canada and US Corps of Engineers.

A compilation of radiation exposure levels in Canada from airborne survey data, undertaken on behalf of the Radiological Protection Bureau, showed that Canada has one of the lowest levels of natural

radiation of all the countries for which similar data are available.

In January 1983 GSC was assigned by DND the responsibility for airborne search operations in the event that Cosmos 1402 debris landed anywhere in Canada. The GSC Skyvan aircraft, a sixteen person Radioactive Alert Team, and four airborne geophysical survey contractors were on stand-by for deployment on January 20 and February 6, the re-entry dates for the two parts of the satellite.

A new technique for engineering seismic studies was developed and successfully applied to mapping the stratigraphy of unconsolidated overburden in Manitoba, the Ottawa area and Quyon Quebec. Several demonstrations were arranged for industry.

Beaufort Sea shallow, wide-angle, multichannel reflection seismic data were compiled, and anomalously high seismic velocities for the shallow marine sediments indicates either overconsolidation or the presence of interstitial ice. Compilation of borehole temperature measurements made in the Beaufort over the past 5 years suggests strong seasonal variation in the near shore sea bottom temperatures. Such variations are important to the thermal design of bottom-founded structures for Beaufort Sea oil and gas development.

Following electromagnetic sounding tests by the GSC to measure thickness of icebonded permafrost at 7 well sites on land in the Tuktoyaktuk area, a contracted EM-37 survey was carried out to determine top and bottom of ice bonded permafrost at 2 offshore well sites in the Beaufort Sea.

Experiments have been undertaken with all GSC borehole methods in the Buchans area of Newfoundland - EM, applied potential (IP, mise-a-la-masse, resistivity), gamma-ray and temperature. Gamma-ray logging clearly identifies volcanic units, and mise-a-la-masse shows promise for delineating sulphide ore bodies.

Preliminary investigations in the Larder Lake area indicate that borehole geophysical methods may be useful for delineating zones of pyritization or potassium alteration associated with gold mineralization.

The geophysics test area, with four deep (up to 300 m) boreholes, established at Bells Corners in 1981 is becoming more widely used as researchers from universities and industry take advantage of the unique spatial arrangement of the boreholes for hole-to-hole techniques.

Construction of a calibration facility for density logging probes commenced at 35 Aberdeen Street with the excavation of a pit to contain cylinders simulating zones of different density rock. An overhead crane assembly has been installed for placing the cylinders in different configurations. This very flexible research facility will be used to develop specifications for establishment of density logging calibration models in Eastern and Western Canada, particularly oriented towards problems of coal logging.

Personnel Notes

C. Cannon - Joined the Radiation Methods Section in October 1982.

J. Glynn - Worked with the Radiation Methods Section, on secondment from National Hydrological Institute, for one year ending in February 1983.

J. Ojo - A geophysicist on the faculty at the University of Ife, Nigeria, arrived in April to spend 6 months with the Resource Geophysics Subdivision on an International Atomic Energy Agency Fellowship.

L. Schock - Joined the Borehole Geophysics Section on August, 23, 1982.

Attendance at Meetings, Conferences and Courses

Q. Bristow - NEA/IAEA Symposium on Uranium Exploration Methods, Paris, France, June 1 to 4, 1982.

- NEA/IAEA Joint Group of Experts on R&D in Uranium Exploration Techniques, Paris, France, June 7 and 8, 1982.

J.M. Carson - Digital Geographic Information Systems Course, The George Washington University, Washington, D.C., May 3-5, 1982.

L.S. Collett - Ontario Exploration Development Fund, Toronto, Ontario, June 17, 1982; December 9-10, 1982; February 16-17, 1983.

- Mineral Exploration Research Institute, Montreal, Quebec, September 21, 1982; Toronto, Ontario, March 6, 1983.

	- Canadian Electrical Association, Toronto, Ontario, July 27, 1982; September 15, 1982, advisor on soil resistivities.
	- AECL Geophysics Workshop on Nuclear Waste Fuel Management, Ottawa, Ontario, February 24-25, 1983; chaired session on methodology.
	- Society of Exploration Geophysicists Conference, Dallas, Texas, October 17-21, 1982.
	- OECD Logging Workshop Conference, September 9, 1982; chaired session. Prospectors and Developers Association, Toronto, Ontario, March 7-9, 1983.
A.V. Dyck	- SEG, Dallas, Texas, October 17-21, 1982.
K.L. Ford	- NATO Advanced Study Institute Seminar and Field Trip, Fredericton, New Brunswick, August 14-20, 1982.
	- Nova Scotia Department of Mines and Energy Annual Review of Activities, Lord Nelson Hotel, Halifax, Nova Scotia, December 1-2, 1982.
J.E. Glynn	- Meeting of Participants in Saskatchewan Prairie Snow Survey Experiment, Reno, Nevada, April 20-23, 1982.
	- Two-Day Meeting on Prairie Snow Cover Experiment, Regina, Saskatchewan, November 16-17, 1982.
J.A. Grant	- North American Data General User's Group 9th Annual Conference, Washington, D.C., August 30 - September 2, 1982.
R.L. Grasty	- NEA/IAEA Uranium Exploration Methods Symposium, Paris, France, June 1982.
	- Two-Day Meeting on Prairie Snow Cover Experiment, Regina, Saskatchewan, November 16-17, 1982.
J.A.M. Hunter	- CSEG Convention, Calgary, Alberta, April 6-7, 1982.
	- SEG, Dallas, Texas, and KEGS Meeting, Toronto, Ontario, May 1982.
	- SEG Annual Meeting, Dallas, Texas, October 17-21, 1982.
T.J. Katsube	- CNS International Conference, Winnipeg, Manitoba, May 1982.
	- GAC-MAC Annual Meeting, Winnipeg, Manitoba, May 17-19, 1982.
P.G. Killeen	- NEA/IAEA Working Group on R&D in Borehole Logging for Uranium Meeting, Marseille, France, May 27 and 28, 1982.
	- NEA/IAEA Uranium Exploration Methods Symposium, Paris, France, June 1982.
	- NEA/IAEA Joint Group of Experts on R&D in Uranium Exploration Techniques, Paris, France, June 7 and 8, 1982.
	- United Nations Interregional Workshop on Drilling in the Mineral Industry, Sudbury, Ontario, August 25, 1982.
J.C. Mwenifumbo	- KEGS-CGU 1982 Spring Meeting, Toronto, Ontario, May 10-12, 1982.
A.K. Sinha	- KEGS, Toronto, Ontario, May 1982.
V.R. Slaney	- Annual Meeting of the Canadian Advisory Council on Remote Sensing, Arnprior, Ontario, March 29 to April 1, 1982.
	- Visited University of Waterloo as a participant in the evaluation of an application for a research equipment grant under the program funded by the Board of Industrial Leadership and Development (BILD), April 29 and 30, 1982.
	- Geosat Committee Annual Meeting, Fort Worth, Texas, December 5-7, 1982.

- ERIM Conference (Remote Sensing for Exploration Geology), Fort Worth, Texas, December 7-10, 1982.

Special Talks and Lectures:

Q. Bristow
- "Comparison of standardized gamma-ray log calibration measurements: Ottawa, Adelaide and Grand Junction". Presented at Review of the NEA/IAEA Symposium, Paris, France, June 1st-4th, 1982.
- "Natural gamma-ray spectral logging using scintillation detectors". Presented at NEA/IAEA Symposium, Paris, France, June 1st-4th, 1982.
- "Instrumentation for natural gamma ray spectrometry". Presented at IAEA Training Seminar on "The Use of Nuclear Analytical Technology and Applications in Mineral Exploration, Mining and Processing", Ottawa, Ontario, June 28 to July 2, 1982.

L.S. Collett
- Invited talk "Geophysics in Placer Exploration". Presented at Dept. of Indian Affairs and Northern Development and Klondike Placer Miners Association, Whitehorse, Yukon, April 23-24, 1982.
- "Borehole Radar". Presented at AECL Geophysics Workshop, Ottawa, Ontario, February 24-25, 1983.

A.V. Dyck
- "The interpretative value of three-component EM surveys in mineral exploration: a model study". Presented at SEG, Dallas, Texas, October 17-21, 1982.

C. Gauvreau
- "Microprocesseur II" course lectures. Presented at CEGEP de L'Outaouais, Hull, Quebec, September 7 to December 13, 1982.
- "Microprocessor III" course lectures. Presented at CEGEP de L'Outaouais, Hull, Quebec, February 23 to May 19, 1983.
- "Applications of a microprocessor development system". Presented at Seminar to Graduating Electronic Technology students of CEGEP de L'Outaouais, Hull, Quebec, March 31, 1982.

R.L. Grasty
- "Primary calibration of a laboratory gamma-ray spectrometer for measurement of potassium, uranium and thorium". Presented at NEA/IAEA Symposium Paris, France, June 1st-4th, 1982.
- "Primary calibration of a laboratory gamma-ray spectrometer for the measurement of potassium, uranium and thorium". Presented at IAEA Training Seminar on "The Use of Nuclear Analytical Technology and Applications in Mineral Exploration, Mining and Processing", Ottawa, Ontario, June 28 to July 2, 1982.
- "Utilizing experimentally derived multi-channel gamma-ray spectra for the analysis of airborne data". Presented at NEA/IAEA Symposium, Paris, France, 1st-4th June 1982.
- "Natural radiation exposure in Canada". Presented at GSC Current Research Forum, Ottawa, Ontario, January 1983.

A. OVERTON
- "A seismic reflection profile across the Lomonosov Ridge, Central Arctic Ocean". Presented at SEG Annual Meeting, Dallas, Texas, October 17-21, 1982.

J.A.M. HUNTER
- "Field experience with the 'optimum window' hammer seismic reflection technique". Presented at SEG, Dallas, Texas, May 1982.
- "Using 'tube wave' method to estimate in-situ rock fracture permeability in a borehole". Presented

at KEGS Meeting, Toronto, Ontario, May 1982.

- "A seismic 'tube' wave method for in-situ estimation of rock fracture permeability in boreholes". Presented at CSEG Convention, Calgary, Alberta, April 6-7, 1982.

T.J. Katsube - "Pore structure of igneous crystalline rocks - their significance in high level nuclear fuel waste isolation". Presented at CNS International Conference on Radioactive Waste Meeting, Winnipeg, Manitoba, May 1982.

- "The effect of alteration and stress on pore structure, porosity, permeability and zonic transport". Presented at GAC-MAC Annual Meeting, Winnipeg, Manitoba, May 17-19, 1982.

P.G. Killeen - "Principles of inverse filtering applied to gamma ray logs". Presented at NEA/IAEA Symposium, Paris, France, 1st-4th June 1982.

- "New scintillation detectors: A review of comparisons of bismuth germanate, cesium iodide and sodium iodide". Presented at NEA/IAEA Symposium, Paris, France, 1st-4th June 1982.

- "Gamma-ray logging in mineral exploration: calibration of radiometric borehole probes". Presented at IAEA Training Seminar on "The Use of Nuclear Analytical Technology and Applications in Mineral Exploration, Mining and Processing", Ottawa, Ontario, June 28 to July 2, 1982.

- "An overview of borehole geophysics for mineral exploration". Presented at United Nations Interregional Workshop on Drilling in the Mineral Industry, Sudbury, Ontario, August 25, 1982.

J.C. Mwenifumbo - "Gamma ray spectral logging in exploration for gold: preliminary studies". Presented at KEGS-CGU 1982 Spring Meeting, Toronto, Ontario, May 10-12, 1982.

A.K. Sinha - "A local VLF transmitter for geological fracture mapping". Presented at KEGS, Toronto, Ontario, May 1982.

Memberships on Committees

J.M. Carson - Member, Departmental Computer Policy Committee's Subcommittee on Alternate Computing Facilities.

L.S. Collett - Member, Engineering and Groundwater Geophysics, SEG.

- Representative, Program for Industry/Laboratory Projects, National Research Council, Branch representative.

- Member, Ontario Exploration Technology Development Fund, Ontario Geological Survey, BILD Program.

- Director, Mineral Exploration Research Institute, Montreal, Quebec.

- Advisor, Advisory Committee on Soil Resistivities, Canadian Electrical Association, Montreal, Quebec.

- Member, Exploration Technology Development Program, GSC/EMR.

- Member, Waves-In-Space Plasma/High Frequency Project Committee, Dept. of Communications.

R.L. Grasty - Member, IAEA Working Group on Improvements in the Measurement of Natural Gamma Radiation.

- Departmental Representative, Working Group on "Radiation in Canada".

J.A.M. Hunter - Member, Permafrost Subcommittee of National Research Council.

- Chairman, Engineering Seismograph Digital Standards Subcommittee, Society of Exploration Geophysicists.

T.J. Katsube
- Chairman, Nuclear Fuel Waste Management Program (NFWMP) Rock Sample Committee.

P.G. Killeen
- Chairman, NEA/IAEA R&D Working Group on Borehole Logging in Uranium Exploration.
- Member of ASTM Task Force on Borehole Sensors.

A.K. Sinha
- Member, Reviews Committee of the Society of Exploration Geophysicists.

V.R. Slaney
- Team Leader, Non-Renewable Resources with the Radarsat Project.
- Member, Executive, Canadian Advisory Council on Remote Sensing.
- Chairman, Geoscience Working Group, Canadian Advisory Council on Remote Sensing.
- Member, (Geoscience) Sursat Project.
- Member, Advisory Committee on Remote Sensing, Nova Scotia Land Surveys Institute.
- EMR Representative, on Geosat Scientific and Technical Committees.
- Participant in the evaluation of an application for a research equipment grant under the program funded by the Board of Industrial Leadership and Development (BILD).

Subdivision Publications

13 Outside Publications
6 Current Research
8 Geophysical Series Maps
1 Open File
21 Oral Presentations

TERRAIN SCIENCES DIVISION

J.S. Scott, Director

Introduction

Responsibilities of the Division are provision of geoscientific data and interpretive information on the surficial geology and geomorphic processes of the Canadian landmass and for such geotechnical aspects of surficial and bedrock materials as may have a bearing on use of the terrain for various purposes. Management responsibility and provision of administrative services to the EMR co-operative program with Atomic Energy of Canada Limited for Nuclear Fuel Waste Management is also centered within the Division.

The objectives of the Division are: to provide a systematic coverage of surficial geology of the Canadian landmass consistent with the information requirements for effective use of the terrain and for the interpretation of Quaternary and Holocene geological events; to acquire an understanding of past and present geomorphic processes; to identify and assess the occurrence and magnitude of natural terrain hazards; to provide geoscience information to assist in the use, maintenance and restoration of the physical environment; and to provide standards, controls, and reference materials to ensure consistency of correlation between geological events of the Pleistocene and Holocene Epochs and to develop and maintain standards of mapping of surficial geology appropriate to national needs.

The Divisional organization comprises four sections. Regional Projects Section activities are directed largely toward geological investigations of the nature, origin and distribution of unconsolidated deposits and landforms, to provide geological maps of the areas investigated and to establish the stratigraphic and environmental history. Paleoecology and Geochronology Section is responsible for paleontological and paleoecological investigations of Quaternary fossil materials as an aid to stratigraphic correlation and determination of paleoenvironments and for the provision of ^{14}C dates on various organic materials. Sedimentology and Mineral Tracing Section is concerned with defining the mechanisms of glacial dispersal of bedrock components in glacial drift and with the determination of its geochemical characteristics. Geomorphic Processes and Engineering Geology Section is concerned with the study of active geomorphological processes with emphasis on the permafrost environment, but including studies of terrain hazards in various regions of southern Canada. This Section is also responsible for studies of the engineering characteristics of geological materials for engineering or terrain use purposes although current activities are directed exclusively to the Nuclear Fuel Waste Management Program.

At the end of the report-period the staff comprised 1 Research Manager, 23 Research Scientists, 12 Physical Scientists (4 terms), 10 technical support (1 term) and 7 administrative support. Staff of the Division are based primarily in Ottawa with small operational units in Calgary at the Institute of Sedimentary and Petroleum Geology and in the Vancouver Office of the Geological Survey.

During the year the Division approved the following for G.S.C. publication: 5 Papers; 1 Memoir; 8 Maps; 6 Open Files; and 2 contributions to Current Research, 82-1 (Pt. C), 12 contributions to Current Research, 83-1 (Pt. A), and 8 contributions to Current Research, 83-1 (Pt. B). In addition 34 papers and 3 abstracts were approved for Outside Publication.

REPORTS ON SECTIONS

DIVISION HEADQUARTERS

Division Headquarters, in addition to the Director's office, comprises the Scientific and Technical Services Unit, which provides editorial and cartographic services, the Administrative and Financial Services Unit and the Secretarial and Clerical Services Unit. Also included in Division Headquarters is one Staff Scientist who carries out research and provides advice to the Branch and other Departments on marine geoscience programs.

Personnel Notes

Division Headquarters consists of a permanent staff of 1 Research Manager, 1 Research Scientist, 2 Physical Scientists, and 7 support staff. The Unit also supported 1 contract and 1 Research Agreement.

M. Price, a hydrogeologist with U.K. Institute of Geological Sciences, was assigned to Terrain Sciences Division in October 1982 for one year as part of the U.K.-Canada Public Servants Exchange Program. During the initial part of his assignment Mr. Price undertook an evaluation of hydrogeological research for the Nuclear Fuel Waste Management Program and reviewed potential applications of geology for sedimentary basin analysis.

Attendance at Meetings, Conferences and Courses

B.R. Pelletier

Presentation to Canadian Marine Geotechnical Society Meeting, Halifax, Nova Scotia, June 1982.

Presented a paper, co-authored with C.F.M.Lewis, S.M. Blasco and R. Sparkes, at the 11th International Congree on Sedimentology, Hamilton, Ontario, August 1982.

J.S. Scott

Geological Association of Canada, Winnipeg, May 1982; participated as one of the Session Chairmen.

Canadian Nuclear Society Annual Meeting, Winnipeg, September 1982; Chairman of session on Geoscience for Waste Disposal.

Membership on Committees

J.A. Lowdon

Geological Survey of Canada Radiocarbon Dating Committee, Member

B.R. Pelletier

Intergovernmental Committee on Submersibles, Member

Maritime Sediments, Associate Editor

Canadian Oceanographic Data System, Member

Lancaster Sound Regional Study Working Group, Member

Advisory Committee on Undersea Features Names, Member

Working Group Marine Atlases for Canada, Member

J.S. Scott

Departmental Committee for Research Manager Classification, Member

NRC Associate Committee on Geotechnical Research, Member

Departmental Task Force for A-Base Review of Surveys and Mapping Branch and Polar Continental Shelf, Member

Departmental Advisory Committee on Access to Information and Privacy, Earth Sciences Sector Representative

Special Talks or Lectures

B.R. Pelletier

Gave a short course "Canadian Marine Geology" to Canadian Hydrographic Service, Ottawa, October 1982.

J.S. Scott

Interview with CBC Radio National Network program "As it Happens" on possible causes of landslides at Ancona, Italy, December 1982.

'Geological research for the Nuclear Fuel Waste Management Program' at the G.S.C. Current Activities Forum, Ottawa, January 1983.

Quaternary Discussion Group

Under the Chairmanship of R.N.W. DiLabio the following papers were presented during April and May 1982.

Ms. I. Kettles, Terrain Sciences Division, GSC, Ottawa — Geochemistry of till on the Frontenac Arch - relevance to acid rain research.

Dr. J-S. Vincent, Terrain Sciences Division, GSC, Ottawa — Quaternary stratigraphy of Banks Island.

Dr. A.S. Dyke, Terrain Sciences Division, GSC, Ottawa — The McClintock Dome of the Laurentide ice sheet.

Mr. P.A. Egginton, Terrain Sciences Division, GSC, Ottawa — Origin and development of mudboils, central District of Keewatin.

Under the Chairmanship of W. Blake, Jr. the following papers were presented from September 1982 to March 1983.

Dr. N.R. Gadd, Terrain Sciences Division, GSC, Ottawa — Southeastern Quebec revisited.

Mr. D.A. Hodgson, Terrain Sciences Division, GSC, Ottawa — Early Holocene ice limits in central Ellesmere Island.

Dr. C.R. Harington, Paleobiology Division, National Museum of Natural Sciences, Ottawa — Quaternary marine and land mammals and their paleoenvironmental implications - some examples from northern North America.

Dr. D.A. St-Onge, Terrain Sciences Division, GSC, Ottawa — INQUA update.

Dr. L.A. Dredge, Dr. R.J. Fulton, Dr. D.R. Grant, Dr. V.K. Prest, Terrain Sciences Division, GSC, Ottawa — IGCP Project 24 (Quaternary Glaciations in the Northern Hemisphere) field excursions in France and Italy, 1982.

Dr. J.V. Matthews, Jr., Terrain Sciences Division, GSC, Ottawa — The climate of the next million years.

Dr. D.R. Grant, Terrain Sciences Division, GSC, Ottawa — The Magdalen Islands.

Dr. Peta J. Mudie, Environmental Marine Geology, Atlantic Geoscience Centre Dartmouth — Pollen and red-tide dinoflagellates: paleoecological records in marine sediments, eastern Canada.

Dr. A.MacS. Stalker, Terrain Sciences Division, GSC, Ottawa — The FINAL word on Laurentide events of the Canadian Great Plains! (OR, Sequences seen while sliding down river bluffs in Alberta over the last 35 years).

REGIONAL PROJECTS SECTION

R.J. Fulton and D.A. St-Onge (Heads)

The prime objectives of the Regional Projects Section are to provide a Canada-wide inventory of surficial materials and landforms and to establish the stratigraphy and environmental history of Quaternary deposits. Projects are designed to provide information on the nature and distribution of surficial materials and on terrain conditions, to determine the geologic history of the Quaternary period and to furnish an understanding of the genesis of deposits and landforms. Terrain and surficial geology information is required for all landuse activities in order to ensure that land resources are used economically, and that development will proceed without unacceptable deterioration of the environment. Important adjuncts of this work are preparation of regional syntheses, which explain the general nature and environmental history of Canada, and the development of expertise in terrain and environmental matters that can be tapped by other agencies.

Highlights

- A major surficial geology mapping project was started on Victoria Island. About 76 000 sq. kms. in the western part of the island was covered this summer. This work will provide a map that can be used for engineering and landuse planning and data that will shed light on the history and mechanism of glacier build-up, flow and retreat in the area.

- Géographie Physique et Quaternaire, v. XXXVI, no. 1-2, 1982 was a special issue edited by two members of the Section. A special grant from N.R.C. made it possible to offer this special issue to participants of the XI Congress of INQUA, Moscow, August 1982. The lead article in this volume presents new concepts by three members of the Section on the configuration and dynamics of the Laurentide Ice Sheet during the Late Wisconsin maximum.

- A 1:1 M scale map summarizing the relationships between surficial materials and major plant communities in the central Queen Elizabeth Islands has been prepared. Boundaries such as the limit of dwarf shrubs ('mini-treeline') and the limit of dwarf shrub dominated communities ('mini-forest limit') were drawn and preliminary coincidence with climatic boundaries is being explored.

- Quaternary stratigraphic studies were conducted along Pasley River, Boothia Peninsula, the best exposures of pre-Late Wisconsin Quaternary sediments in the central Arctic. The sections expose two major glacigenic units (till/glaciomarine complexes) separated by thick nonglacial (fluvial and marine) sediments dated >37 000 B.P. Paleoecological and geochronological studies are continuing.

- Drilling allowed to extend downward the stratigraphy visible in a pit face at Pointe-Fortune. The unit, organic deltaic sand and silty sand, where the greater than 42 000 radiocarbon age has been obtained, underlies the pit floor. It shows a gradual contact with a dark massive, fining-upward lacustrine sequence containing freshwater ostracods. Sandier sediments underlie the lacustrine sediments and rest on a stony till penetrated for about 2 m.

Personnel Notes

The Regional Projects Section consists of a permanent staff of 11 Research Scientists, 5 Physical Scientists, and 1 C.E.I.P. employee. The Section also supported 4 contracts and 4 EMR Research Agreements.

R.J. Fulton has been relieved of responsibility for Regional Projects Section personnel in Ottawa, so that he can devote more time to the major task of co-ordinating Divisional and national efforts in the revision of the Quaternary portion of Geology and Economic Minerals of Canada.

D.A. St-Onge was appointed to Terrain Sciences Division in September 1983 for an initial assignment of one year under provisions of the Canada Executive Interchange Program. He has assumed duties as Acting Section Head, Regional Projects Section, Ottawa personnel.

D.R. Sharpe joined the Division and the Federal Government in June 1982. He received his M.Sc. in 1974 from the University of Colorado.

Attendance at Meetings, Conferences and Courses

J.J. Clague

American Quaternary Association Conference, Seattle, Washington, June-July 1982.

Presented a paper at the Workshop on Alaskan Glaciation, Fairbanks, Alaska, March 1983.

L.A. Dredge

Presented two papers at the Geological Association of Canada Annual Meeting, Winnipeg, May 1982, and co-organzied a post conference field trip.

S.A. Edlund

Presented a paper and a display at the 12th Arctic Workshop, Amherst, Massachusetts, March 1983.

R.J. Fulton

Presented a paper at the Geological Association of Canada Annual Meeting, Winnipeg, May 1982.

R.J. Fulton (cont'd.)

Presented a paper at the IGCP Project 24 Meeting, Paris, France, September 1982.

American Commission on Stratigraphic Nomenclature, New Orleans, October 1982.

D.R. Grant

Presented a paper and poster session at the IGCP Project 24 Final Meeting, UNESCO Headquarters, Paris, France, September 1982, and participated in field excursions in France, Italy and Corsica.

O.L. Hughes

Presented a paper at the Workshop on Alaskan Glaciation, Fairbanks, Alaska, March 1983.

R.W. Klassen

Presented a paper at the Geological Association of Canada Annual Meeting, Winnipeg, May 1982, and participated in the post conference field trip.

S.H. Richard

45th Annual Meeting of the Friends of the Pleistocene and took part in field trips in the St-Hyacinthe-Drummondville area, Québec, May 1982.

D.A. St-Onge

Member of Canadian delegation to a meeting in Dakar, Sénégal organized by I.D.R.C. to explore areas where co-operation between francophone African countries and Quaternary geoscientists in Canada can be developed.

Orientation course for Interchange Canada participants.

D.R. Sharpe

Ontario Geological Survey Geoscience Forum, Toronto, September 1982.

J.J. Veillette

50th ACFAS Congress-AQQUA Symposium, Montreal, May 1982, and participated in field trip.

J-S. Vincent

Presented two papers at the 50th ACFAS Congress-AQQUA Symposium, Montreal, May 1982, and participated in field trip.

Presented a paper at the IGCP Project 24 Symposium at GAC meeting in Winnipeg, May 1982, and participated in field trip.

J-S. Vincent (cont'd.)

Presented a paper at the Symposium on Amino Acid Geochronology, New Orleans, October 1982.

Presented a paper at the Symposium on Arctic Quaternary Events and Chronology, New Orleans, October 1982.

Membership on Committees

J.J. Clague

INQUA Commission on Genesis and Lithology of Quaternary Deposits, Corresponding Member (term expired Aug. '82)

INQUA Subcommission on North American Quaternary Stratigraphy, Member

INQUA Commission on Quaternary Shorelines, Subcommission for the Americas, Member

A.S. Dyke

INQUA Commission on Quaternary Shorelines, Subcomission for the Americas, Member (term expired Aug. '82)

IGCP Project 24, Arctic Canada Working Group, Member

S.A. Edlund

Canadian Committee on Ecological Land Classification, Northlands Ecoregion Working Group, Member

R.J. Fulton

Quaternary Advisory Group to North American Commission on Stratigraphic Nomenclature, Member (disbanded Oct. '82)

Geological Survey of Canada Radiocarbon Dating Committee, Member

Working Group, IGCP Project 73/1/24, Member

Expert Committee on Soil Survey, Agriculture Canada, EMR Representative

North American Commission on Stratigraphic Nomenclature, Commissioner

N.R. Gadd

Conseil Scientifique, Géographie Physique et Quaternaire, Member

D.R. Grant

INQUA Commission on Quaternary Shorelines, President

Canadian Quaternary Asssociation, Secretary-Treasurer

D.R. Grant (cont'd.)

NRC Canadian National Committee for INQUA, Secretary

IGCP Project 24, Atlantic Provinces Subgroup, Leader

IGCP Project 61, International Working Group, Member (Project terminated Aug. '82)

IGCP Project 200, Executive Board Member

North American Working Group of the IAG Commission on Recent Crustal Movements, Member

Atlantic Committee on Soil Survey, Member (retired Nov. '82)

O.L. Hughes

Environmental Assessment and Review Panel, Alaska Highway Gas Pipeline Project, Panel Member

D.A. St-Onge

CNC-INQUA, President

Geological Association of Canada, Member of Council

Royal Canadian Geographical Society, Secretary; Research Committee, Chairman; Editorial Committee and Massey Medal Committee, Member

Canadian Geoscience Committee on Quaternary Studies in Canada, Member

A.M. Stalker

Canadian Quaternary Association, Chairman

International Geological Correlation Program, IGCP Project 128, Member

INQUA Subcommittee on North American Quaternary Stratigraphy, Member

S.I.L. Working Group on "International projects on deep coring operations on relict lakes of the world", Member

Canadian National Committee for I.U.G.S., Member

J-S. Vincent

Association québécoise pour l'étude du Quaternaire, Président

Géographie physique et Quaternaire, Rédacteur adjoint

IGCP Project 24, Western Arctic Subgroup, Leader

Special Talks or Lectures

S.H. Richard

'Surficial geology of Ottawa-St. Lawrence Lowlands' for the G.S.C. Current Activities Forum, Ottawa, January 1983.

D.A. St-Onge

'The Coppermine River Valley: Exciting History and Natural Beauty of the Barrens', at the Nippising College, North Bay, Ontario, November 1982.

J-S. Vincent

'Configuration and dynamics of the Laurentide ice sheet during the Late Wisconsin maximum' at the G.S.C. Current Activities Forum, Ottawa, January 1983.

PALEOECOLOGY AND GEOCHRONOLOGY SECTION

W. Blake, Jr. (Head)

The work of the Paleoecology and Geochronology Section is mainly of a laboratory nature, but specialized field studies, such as the coring of lake sediments, are carried out by staff members. In 1982 field work was undertaken in: (1) Newfoundland, Nova Scotia, Quebec, and Ontario, and (2) Bylot, Devon, and Ellesmere Islands. These field investigations, together with laboratory studies of previously collected samples, have provided additional information on past environments throughout Canada. Because the analyses of fossil diatoms, insects, marine invertebrates, pollen, seeds and wood are often coupled with radiocarbon age determinations, an appreciation is being gained of the rates at which the environment is changing and of the rates at which processes are occurring.

Highlights

- The Radiocarbon Dating Laboratory, now in its 23rd year of operation, has completed more than 3700 age determinations on a variety of organic materials — wood, peat, gyttja, shells, bone, antler, horn, ivory, charcoal, and hair. These age determinations bear on problems such as the time of deglaciation or the time that a given area emerged from the sea. In some localities it has been possible to bracket the time of glacial advances. In other localities an appreciation has been gained of the rates at which changes in the environment are occurring or the rates at which a variety of processes are taking place. Results of the dating program are published annually in the GSC Paper Series; List XXII has now appeared.

- Although field work for the Yukon Refugium Project, a major interdisciplinary study in which the Section participates (especially with regard to fossil insects, plant macrofossils, and radiocarbon dating) was completed in 1981, paleoecological and stratigraphical studies continue. This study has involved GSC staff members as well as personnel from the National Museum of Man, the National Museum of Natural Sciences, the University of Alberta, the University of Minnesota, the University of Alaska and the U.S. Geological Survey. A major book, summarizing many of the studies made, was published by Academic Press in 1982; it is entitled "Paleoecology of Beringia".

- A second major interdisciplinary project is concerned with the glacial history of east-central Ellesmere Island and the adjacent coasts of northwest Greenland. Related studies include fluctuations of sea level, botany, rock weathering, climatic change (as deduced from the record of pollen and diatoms preserved in lake sediments), and the development of boulder baricades and geomorphic processes occurring at the present coast. In addition to GSC personnel, participants have come from the University of Helsinki, the University of Copenhagen, Norsk Polarinstitutt, Scarborough College (University of Toronto), Sir Sandford Fleming College, Memorial University of Newfoundland, McMaster University, and Queen's University. The geological and botanical studies complement archeological investigations being carried out in the area by the Arctic Institute of North America.

- Another area of emphasis involves palynological studies over a broad area extending from the Great Lakes to the Maritime Provinces. The palynological studies are often coupled with studies of plant macrofossil and fossil arthropods, and a major report on an interglacial site in Nova Scotia appeared as a chapter in a 1982 issue of Géographie Physique et Quaternaire prepared for the XI INQUA Congress. Not only is a detailed knowledge of vegetation history emerging from these investigations, but cross-checking of radiocarbon dates on marine and terrestrial materials may be possible. One of the chief aims of the project is to resolve chronological problems between the Champlain Sea, which formerly occupied the Ottawa-St. Lawrence Lowland, and the Great Lakes area.

- With regard to diatoms, emphasis is being placed on studying near-surface lake sediments from selected sites in Ontario and Quebec to determine the effects of acid rain on the aquatic environment. A second major study involved the collecting of surface snow samples from several Arctic ice caps; all samples contained diatoms, including marine species indicative of long distance transport.

Personnel Notes

The Paleoecology and Geochronology Section consists of a permanent staff of 5 Research Scientists, 1 Physical Scientist, and 3 Technicians. In addition, 3 Physical Scientists work in support positions. The Section also supported 3 contracts and 4 EMR Research Agreements.

S.H. Watts, a staff member of the Sir Sanford Fleming College, Lindsay, Ontario, spent the academic year 1982-83 working with the Section while on sabbatical leave. He has continued his studies of Arctic weathering processes.

Attendance at Meetings, Conferences and Courses

T.W. Anderson

Presented a poster display, together with C.F.M. Lewis (AGC), at the Seventh Biennial Conference of the American Quaternary Association, Seattle, Washington, June 1982.

S. Federovich

Seventh International Symposium on Living and Fossil Diatoms, Academy of Natural Sciences, Philadelphia, Pennsylvania, August 1982; participated actively in a discussion group on Snow & Ice Diatoms.

J.V. Matthews, Jr.

Third North American Paleontological Convention, Montreal, August 1982; participated in a Symposium on Cenozoic Insects.

Joint Meeting of the Entomological Society of America/Entomological Society of Canada, Toronto, November-December 1982; participated in a special symposium on the origin of the North American insect fauna.

R.N. McNeely

Eleventh International Radiocarbon Conference, Seattle, Washington, June 1982. On the same trip radiocarbon dating laboratories at the University of Washington, Simon Fraser University, and the Saskatchewan Research Council were visited.

R.J. Mott

Participated in a field trip in New Brunswick and Maine, August 1982, organized by the New Brunswick Quaternary Association.

Membership on Committees

T.W. Anderson

Canadian National Committee for INQUA, Member

National Research Council Peat Forum, Member

Geological Survey of Canada Radiocarbon Dating Committee, Member

W. Blake, Jr.

American Quaternary Association, Councillor 1982-1986

Holocene Sub-Commission for the Americas and Greenland (INQUA), Member

Fellows Committee, Arctic Institute of North America, Calgary, Chairman

Canadian Committee on Climatic Fluctuations and Man, Member

Geological Survey of Canada Radiocarbon Dating Committee, Chairman

Geological Survey of Canada Library Policy Committee, Member

W. Blake, Jr. (cont'd.)

Ph.D. Thesis Committee for M. Krawetz, Department of Geography, McMaster University, Hamilton, Ontario, Member

J.V. Matthews, Jr.

Scientific Committee for a Biological Survey of Canada (Terrestrial Arthropods Component), Member

Climate Planning Board, Alternate Member

R.J. Mott

Branch Safety Committee, Member

Special Talks or Lectures

T.W. Anderson

'The Mid-Holocene Nipissing Flood into Lake Ontario' at the G.S.C. Current Activities Forum, Ottawa, January 1983.

Laboratory Statistics

Paleoecology

1. Samples processed

Diatom samples	96
slides prepared	558
slides investigated	386
Palynological	421
Wood treatments	124

2. Reports completed:

Diatom	9
Fossil Arthropod	31
Palynological	14
Plant Macrofossils	42
Wood	59

Geochronology

3. Determinations completed:

Radiocarbon ages (GSC)	
Geological samples	213
Archeological samples	6
Geochemical samples	10
$^{13}C/^{12}C$ and $^{18}O/^{16}O$ ratios (University of Waterloo - contract)	174
Amino acid determinations (University of Alberta - contract)	26

SEDIMENTOLOGY AND MINERAL TRACING SECTION

W.W. Shilts (Head)

The primary task of the Section is to provide information on the physical and mineralogical-chemical properties of glacial and associated surficial sediments of Canada. Research is aimed at providing basic data on regional variations in drift properties and at developing techniques of using drift composition to aid in prospecting or evaluation of environmental or geotechnical problems. In addition, members of the Section do basic research on glacial and lacustrine sedimentation and map surficial sediments where necessary to support sedimentological, geochemical, or remote sensing activities.

The Sedimentology-Engineering Geology Laboratories are administered within this Section. These Laboratories provide research facilities and analyses as well as preparation of samples for Terrain Sciences Division staff and for other scientists within and outside of the Geological Survey.

Highlights

- Compilation of surficial geology of 26 x 1:250 000 NTS sheets was completed at a scale of 1:500 000 for southern and central District of Keewatin, culminating 10 years of airphoto and ground mapping at an original map scale of 1:125 000. This map, "Surficial geology of southern and central Keewatin", covers an area of 275 000 km^2 (approximately the area of the N.E. United States including New York), and will be included ultimately in a G.S.C. memoir on southern Keewatin. The map was displayed and described in a paper presented at the Yellowknife Geoscience Forum in December 1982.

- Sonar profiling of lakes was continued with spectacluar records being obtained through sediment thicknesses of 30 metres or more in many of the 30 lakes profiled. The results show that sonar can show the effects of strong earthquakes on lake bottoms, suggesting that sonar techniques might be used to assess long-term seismic stability of areas considered for such seismically sensitive activities as disposal of radioactive waste, siting of nuclear reactors, etc. In addition to yielding important insights into late-glacial history of lake basins, sonar techniques may also be used to plan mineral exploration drilling, to interpret geophysical results (EM, gravity) over lakes, and to aid in assessing sensitivity of lakes to acid rain.

- A traverse of the Fawn and Severn Rivers was carried out by boat and the extensive glacial sediment sections exposed along those rivers were studied and sampled in detail. New interglacial and interstadial beds were found and marine shells of various ages were collected and submitted to University of Colorado for amino acid analysis. A paper reporting the first aminostratigraphic framework for the Hudson Bay Lowlands appeared in Quaternary Research in January.

- Sampling of drift to determine its sensitivity to acid rain continued on the southeastern Shield in Gatineau County and Gatineau Park, Quebec. Similar work on the Frontenac Arch in Ontario has revealed carbonate anomalies in the drift that are possibly related to unknown Paleozoic outliers and geochemical anomalies that may be of interest for mineral prospecting.

- Mapping of the Quaternary geology of the Haliburton, Ontario region continued, and the results will serve as the basis for a Ph.D. thesis at the University of Illinois.

- Detailed drift geochemistry was carried out around a train of radioactive boulders in eastern Labrador in an attempt to find their source. The results of this study will provide an interesting comparison with results from a similar study carried out in 1981 on the Labrador-Quebec border.

- A study of the sand-sized heavy minerals from bottom sediments in Hudson Bay revealed dispersal patterns related to glacial transport and some patterns related to underlying bedrock. A large and rich source of siderite underlies the Bay, one sample northeast of Churchill containing over 50% siderite in the heavy mineral fraction.

- Substantial progress has been made in defining the role of microbiological fixation of manganese in concentrating trace elements in lake sediments. The manganese-uranium combination has been particularly intensely studied.

- A technique for estimating the Acid Neutralizing Capacity (ANC) of till has been developed as part of the acid rain-related research of the Section.

Personnel Notes

The Sedimentology and Mineral Tracing Section consists of a permanent staff of 3 Research Scientists, 3 Physical Scientists, and 6 Technicians. In addition 3 Physical Scientists work in support positions. The Section also supported 1 contract and 1 EMR Research Agreement.

I. Kettles joined the Division in October 1982 after being employed as a term casual for the past four years.

Attendance at Meetings, Conferences and Courses

J.D. Adshead

Presented a paper at the Eleventh International Congress on Sedimentology, Toronto, August 1982.

J.R. Bélanger

Presented a paper at the COSPAR Conference (Committee on Space Research), Ottawa, May 1982.

R.N.W. DiLabio

Presented a paper at the 5th Symposium on Prospecting in areas of Glaciated Terrain, St. John's, Newfoundland, August 1982.

I. Kettles

Presented a poster session at the 5th Symposium on Prospecting in areas of Glaciated Terrain, St. John's, Newfoundland, August 1982.

R.A. Klassen

Presented a paper at the Geological Association of Canada Annual Meeting and participated in field trip, Winnipeg, May 1982.

W.W. Shilts

Presented two papers at the Geological Association of Canada Annual Meeting and participated in field trip, Winnipeg, May 1982.

Presented a paper at the Boreal Forest Ecosystems Conference, Thunder Bay, August 1982.

Presented a paper at the Annual Geomorphology Conference, Binghampton, New York, September 1982.

Presented a poster session at the 95th Annual Meeting of the Geological Society of America Conference, New Orleans, September 1982.

Membership on Committees

J.R. Bélanger

Branch Computer Facilities Committee, Member

Terrain Sciences Divisional Computer Committee, Member

R.N.W. DiLabio

Divisional Display Committee, Member

W.W. Shilts

INQUA Commission on Genesis and Lithology of Quaternary Deposits, Corresponding Member

INQUA, Working Group 9, Glacigene Deposits as Indicators of Glacial Movements, Member

International Geological Correlation Program (Quaternary Glaciations in the Northern Hemisphere), Member

Research and Monitoring Co-ordinating Committee on Acid Rain, Member

Acid Rain Research, Geological Survey, Co-ordinator

U.S.-Canada terrestrial effects work group - Acid Rain (LRTAP) negotiating committee, Member

Special Talks or Lectures

J.R. Bélanger

'Extracting geological information from Remote Sensing Imagery' at the G.S.C. Current Activities Forum, Ottawa, January 1983.

'Remote sensing and geology' to the Canadian Spectroscopic Society, Ottawa, March 1983.

R.N.W. DiLabio

'Recent results of drift prospecting studies' to the Toronto Quaternary Discussion Group, Ontario Geological Survey, Toronto, March 1983.

R.A. Klassen

'Glacial history of Bylot Island' at the Pacific Geoscience Centre, Patricia Bay, Vancouver Island, June 1982.

'Glaciers of Bylot Island, N.W.T.' to the Kiwanis Club of Ottawa, Ottawa, October 1982.

'Glaciers of Bylot Island, N.W.T.' to the City View Kiwanis Club, Ottawa, January 1983.

'Glaciers and glacial deposits of Bylot Island, N.W.T.' to staff and students of graduate course in Quaternary geology, University of Alberta, Edmonton, February 1983.

'The glacial history of Bylot Island, N.W.T.' to faculty and students, Department of Geology, University of Alberta, Edmonton, February 1983; and the same talk to faculty and students, University of Waterloo, Waterloo, March 1983.

R.A. Klassen (cont'd.)

'Glaciers of Bylot Island, N.W.T.' to the Ottawa Surgical Society, Ottawa, March 1983.

W.W. Shilts

'Application of geological techniques to some current environmental problems - radioactive waste disposal and acid rain' to the Departmental Discussion Group, University of Waterloo, Waterloo, November 1982.

'Quaternary stratigraphy of the Hudson Bay Lowlands' to the Quaternary Discussion Group, University of Waterloo, Waterloo, November 1982.

'Application of glacial geological techniques to problems in radioactive waste disposal' at the AECL Workshop, E.P.B., November 1982.

'Surficial geology maps of central and southern Keewatin' (with J. Aylsworth) at the Yellowknife Geoscience Forum, Yellowknife, December 1982.

Laboratories

Physical Sedimentation Laboratory, Tunney's Pasture

This Laboratory is operating at 3/4 strength because of a shift of one person to the Drift Chemistry and Mineralogy Laboratory on Booth Street.

Yearly Report

	No. of Samples
Freez Drying	1550
Complete Sieve & Pipette	217
Gravel-Sand-Silt-Clay	1838
Hygroscopic Moisture Content	2018
Atterberg Limits	12
Calcite/Dolomite Ratio	19
Total Carbonate (acid dissolution)	35
Munsell Soil Colour	44

Drift Chemistry and Mineralogy Laboratory

Much effort is expended by both laboratories in maintaining a drift sample reference collection and computer file for rapid location of samples for further analyses.

Production Summary

	No. of Samples
Clay Separations (for chemical analysis)	2125
Dry sieving to <64µm (for carbonate determination)	933
Carbonate/non-carbonate carbon determinations (Leco carbon analyzer)	1204
Heavy mineral separations	170
Grinding of coarse fractions (for chemical analysis)	200

Geomorphic Processes and Engineering Geology Section

J.A. Heginbottom (Head)

The task of the Geomorphic Processes and Engineering Geology Section is to provide information on the nature and occurrence of geomorphic processes and on the engineering characteristics of geological materials in Canada, including the continental shelves. Particular emphasis is placed on processes of the permafrost environment of northern Canada, and on studies related to landslide hazards. The work of the Section also includes studies related to resource development in the mountains of western Canada and studies of fluvial processes. Facilities available in the Section include a cold room and an 18 m recirculating flume.

Highligths

- Assessment of the effects of short term spring flooding on the update of heavy metals by trees, and of the implications of this process for biogeochemical prospecting.
- Commencement of a major study on large landslides in Canada, and of landslide hazard in the Cordillera.
- Commencement of the compilation of a new permafrost map of Canada, to emphasize ground ice conditions.

Personnel Notes

The Geomorphic Processes and Engineering Geology Section consists of a permanent staff of 3 Research Scientists, 2 Physical Scientists and 1 Technician. The Section also supported 2 contracts and 1 EMR Research Agreement.

S.G. Evans joined the Division and the Federal Government in October 1982. He received his M.Sc. in 1977 from the University of London and will be defending his thesis for his Ph.D. this year.

Attendance at Meetings, Conferences and Courses

J.A. Heginbottom

Presented a paper at the Annual Meeting of the Canadian Association of Geographers, Ottawa, June 1982.

Meeting of the Permafrost Subcommittee, NRCC, Calgary, October 1982.

L.E. Jackson

Presented a paper at the Yukon Geoscience Forum, Whitehorse, December 1982.

P.J. Kurfurst

23rd U.S. Rock Mechanics Symposium, Berkeley, California, August 1982.

35th Canadian Geotechnical Conference, Montreal, September 1982.

25th Annual Meeting of the Association of Engineering Geologists, Montreal, September 1982.

Membership on Committees

J.A. Heginbottom

Permafrost Subcommittee, NRC Associate Committee on Geotechnical Research, Member

Working Group on Ground Ice, International Commission on Snow & Ice, Member

Commisssion on the Significance of Periglacial Phenomena, International Geographical Union, Correspondence Member

Terrain Sciences Division Display Committee, Chairman

Interdepartmental Working Group on Proposed IBP Ecological Sites, Member

L.E. Jackson

I.S.P.G. Library Committee, Member

I.S.P.G. Safety Committee, Member

International Conference on Palynology 1984, Member; Organizing Committee, Member; Field Trips Subcommittee, Chairman

P.J. Kurfurst

EMR/AECL Drilling Committee, Chairman

Underground Research Laboratory Project Management Committee, Member

Underground Research Laboratory Site Evaluation Subcommittee, Chairman

Committee on Needed Research for Northern Pipelines, Member

NEP Subcommittee on Canadian Facility for Controlled Environmental Research and Testing, Member

Special Talks or Lectures

P.A. Egginton

Presented a poster at the G.S.C. Current Activities Forum, Ottawa, January 1983.

S.G. Evans

'Landslides in the Canadian Cordillera' to the Department of Geology, University of British Columbia, and the Cordillera Division, G.S.C., Vancouver, January 1983.

STAFF LIST

(to March 31, 1983, as supplied by reporting units)

DIRECTOR GENERAL'S OFFICE

Price, R.A., Director General
Smalldridge, J., Secretary
Fyles, J.G., Chief Geologist
Birtch, E.J., Secretary
Hall, E., Scientific Executive Officer

Special Projects

Boulton, T.E.
Okulitch, A.

Program Office

Benson, D.G.
Petre, M.A.
Carr, E.J., Secretary

International Union of Geological Sciences

Berger, A.R.
Collis, B., Secretary

Administrative Services

Claude, Y.P.
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