



**CANADIAN  
GEOSCIENCE  
COUNCIL**

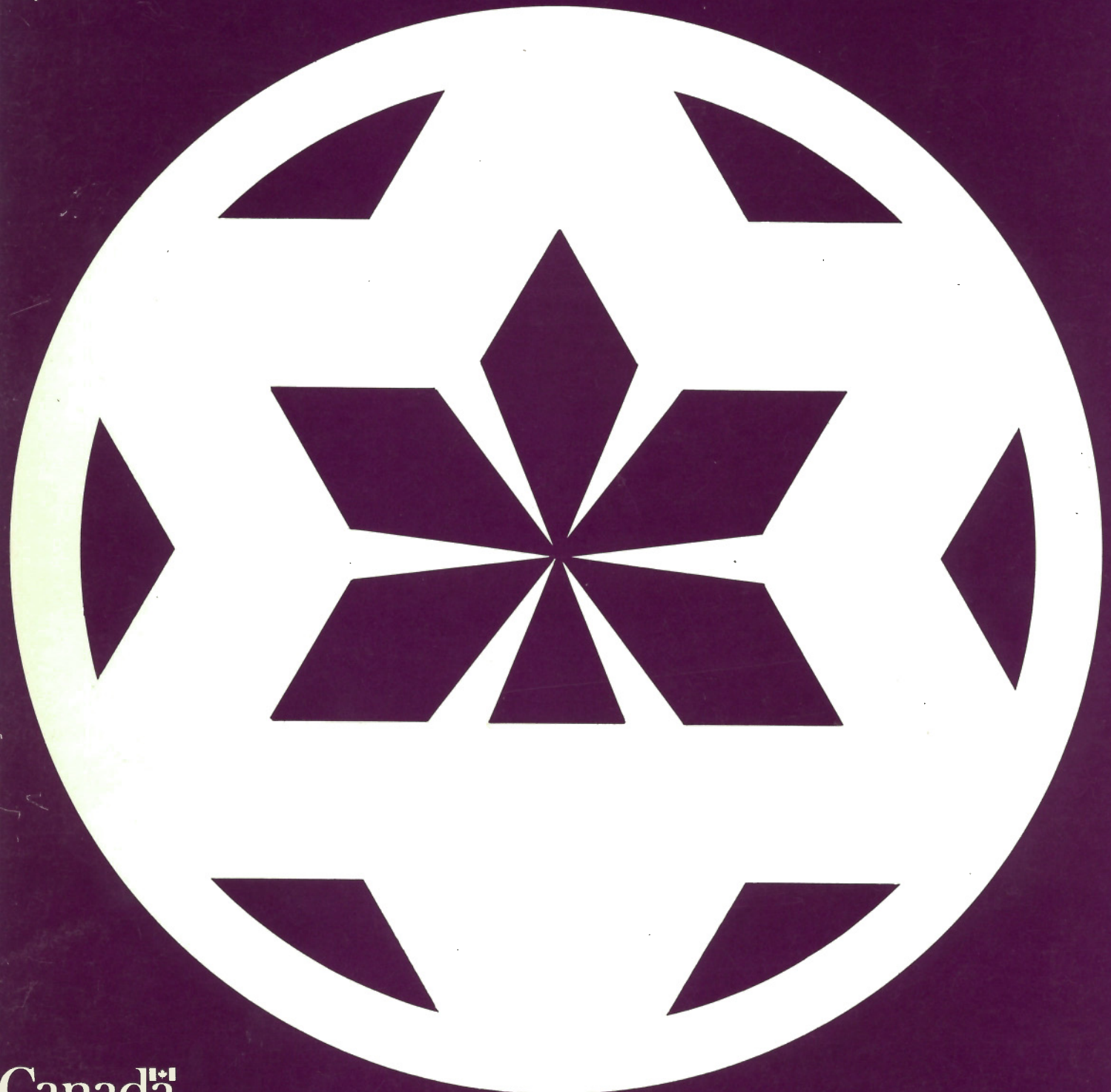
**THE GEOSCIENCES  
IN CANADA, 1985**

**ANNUAL REPORT**

Prepared by  
The Canadian Geoscience Council

Published for the Council by the  
Geological Survey of Canada as  
Paper 86-6

Edited by D.F. VanDINE



#### ACRONYMS COMMONLY USED IN THIS REPORT

<b>AECL</b>	Atomic Energy Canada Limited	<b>GAC</b>	Geological Association of Canada
<b>AEG</b>	Association of Exploration Geochemists	<b>GSA</b>	Geological Society of America
<b>AGID</b>	Association of Geoscientists for International Development	<b>GSC</b>	Geological Survey of Canada
<b>APEGGA</b>	Association of Professional Engineers, Geologists and Geophysicists of Alberta	<b>ICL</b>	Inter-Union Commission on the Lithosphere
<b>CANQUA</b>	Canadian Quaternary Association	<b>IGCP</b>	International Geological Correlation Program
<b>CCCESD</b>	Council of Chairman of Canadian Earth Science Departments	<b>IGU</b>	International Geographical Union
<b>CGC</b>	Canadian Geoscience Council	<b>IMA</b>	International Mineralogical Association
<b>CGS</b>	Canadian Geotechnical Society	<b>INQUA</b>	International Union for Quaternary Research
<b>CGU</b>	Canadian Geophysical Union	<b>IUGG</b>	International Union for Geodesy and Geophysics
<b>CIM</b>	Canadian Institute of Mining and Metallurgy	<b>IUGS</b>	International Union of Geological Sciences
<b>CSEG</b>	Canadian Society of Exploration Geophysicists	<b>MAC</b>	Mineralogical Association of Canada
<b>CSPG</b>	Canadian Society of Petroleum Geologists	<b>NSERC</b>	Natural Sciences and Engineering Research Council of Canada
<b>EMR</b>	Department of Energy, Mines and Resources (Canada)	<b>ODP</b>	Ocean Drilling Program
<b>EPB</b>	Earth Physics Branch (EMR)	<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organization





Energy, Mines and  
Resources Canada

Énergie, Mines et  
Ressources Canada

**GEOLOGICAL SURVEY OF CANADA  
PAPER 86-6**

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ANNUAL REPORT**

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1986

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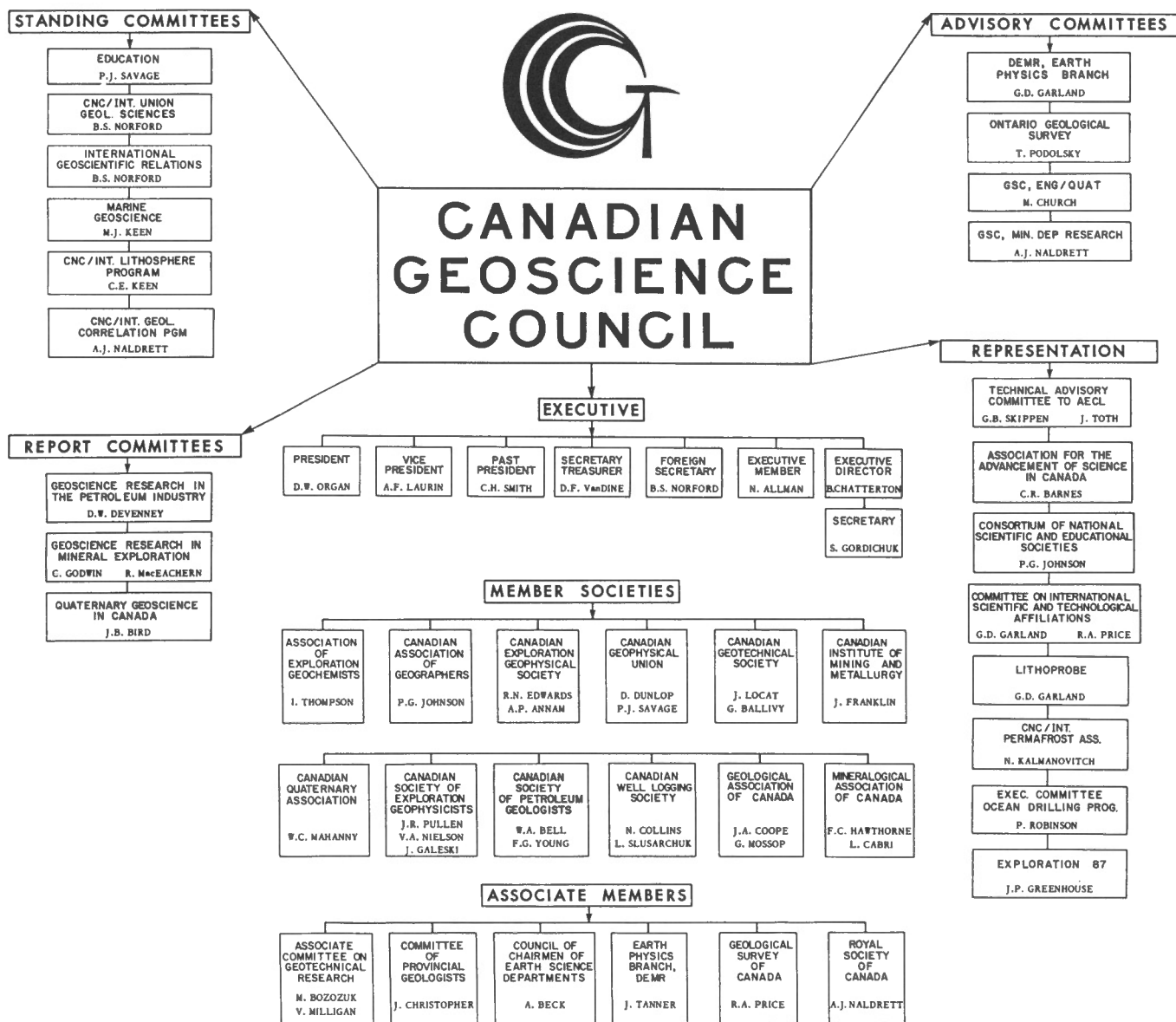
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## REPORT OF THE PRESIDENT

### **Introduction**

The objectives of the Canadian Geoscience Council (CGC) are to provide a central cooperative forum for earth science societies in Canada, to provide useful advice to governments on geoscience policy, and to work toward the continued health of geoscience in Canada.

The year 1985 may be regarded as a time of positive adjustment. Canada's government, universities and natural resource industries appear to be feeling their way with cautious optimism to new economic ground and are gradually becoming accustomed to changing world conditions.

Council met four times in 1985: in March, in conjunction with the Prospectors and Developers Convention in Toronto; in May, in Fredericton during the annual GAC/MAC joint meeting; in September, in Edmonton during the conference of the Canadian Geotechnical Society; and the annual meeting of the Council with representatives of EMR, in Ottawa, in early December.

### **Publications**

Three reports of Advisory Committees were submitted during 1985.

1. Report of the Advisory Committee to the Ontario Geological Survey – Dr. T. Podolsky, Chairman.
2. Report of the Advisory Committee to the Earth Physics Branch, EMR – Dr. G.D. Garland, Chairman.
3. Report of the Advisory Committee to the Geological Survey of Canada on Mineral Deposits Research – Dr. A.J. Naldrett, Chairman.

These reports will be available from Council headquarters in Edmonton when published.

### **Major Studies in Progress**

The following four major studies are in progress.

1. The Nature, Scope and Organization of Geoscience Research in the Canadian Petroleum Industry – this study has been undertaken by a private consultant, Mr. D. Jardine, under the committee chairmanship of Dr. D.W. Devenny. A first draft of the study report was presented to the Department of Energy, Mines and Resources and to the Canadian Petroleum Association, who have jointly funded the project, in July of this year. The report will be finalized during 1986.
2. Geoscience Research in Mineral Deposits – the grave difficulties that overshadow the mineral exploration industry in Canada are reflected in the difficulties that the committee charged with this study has encountered bringing the work to a successful completion. The difficulties encountered by the Canadian mineral industry make the continued pursuit of this study all the more necessary. The Council has recently appointed Dr. C. Godwin to assist with this committee.
3. Geological Accreditation – a primary objective of the Council in this area is to ensure that students who undertake a geological education are aware of what courses of study can lead to their registration as professional geologists by the established provincial administrations. Mr. J. Maher, a Past-President of CSPG, is Chairman of the CGC Committee on this subject and continues to work toward a common syllabus of study acceptable to governing bodies across Canada.
4. The Quaternary Geosciences in Canada – a committee chaired by Dr. J.B. Bird is nearing completion of this review and a report on the project should be available in early 1986.

### **Advisory Committees**

The Council has acted as a central body providing geoscience advice in a number of areas.

1. Technical Advisory Committee to the AECL on Nuclear Fuel Waste Management Program. During the year Dr. J. Toth resigned from this committee and was replaced by Dr. W.A. Meneley. Dr. G.D. Skippen continues as the other CGC representative on the AECL committee.
2. Advisory Committee to the Frontier Geoscience Program, EMR. The Council presented a list of 27 names for consideration by EMR in developing an Advisory Committee to this program. The committee has been named and includes R. Cote, Z. Hajnal, I. Hutcheon, P. Purcell and P. Savage.
3. Advisory Committee to the Geological Survey of Canada on Engineering and Quaternary Geology – a report on a review by this committee, chaired by Dr. M. Church should be available in early 1986.

### **Ocean Drilling Program (ODP)**

During 1985, Canada became a full participant in this international program engaged in world-wide deep sea drilling for scientific information. Other signatories to the program, to be undertaken



around the world by the drill ship JOIDES RESOLUTION, are the United States, France, Japan and West Germany. The program began in January 1985. Leg 105 of the program was undertaken in Baffin Bay and the Labrador Sea with the ship visiting St. John's, Newfoundland, in late October.

A committee of the CGC, known as the Canadian National Committee for ODP has been struck to provide scientific advice for this program. The committee consists of J.G. Malpas, F. Gradstein, M. Salisbury, R. Hyndman, R. Smyth, A.E. Soregaroli, R.E. Wyman, S. Du Toit, S.D. Scott, T. Tankard, M.J. Keen and P.T. Robinson.

The CGC also named four members to the central ODP Council which provides advice to the Canadian Government on continuation of the project. CGC Council members are D.W. Strangway, W.E. Barratt, O.E. Owens and the 1986 CGC President, A.R. Laurin.

The Secretariat of the ODP is currently located at Dalhousie University and is chaired by Dr. P. Robinson.

### ***International Affairs***

The International Geological Correlation Program and the International Lithosphere Program continued to provide vital coordination and financial support to a number of international projects of interest to Canada, but extensive reductions in total UNESCO funds places future financial support in jeopardy. Planning continues for a number of International Geoscientific Conferences to be hosted by Canada in 1986 and 1987, including those in Exploration Geochemistry, Rock Mechanics and Geodesy and Geophysics.

### ***Administration***

In March 1985, headquarters of the Council moved from the University of Waterloo to the University of Alberta. Dr. B. Chatterton became the CGC Executive Director.

A revised Constitution and By-Laws of the CGC were prepared by C.H. Smith, Past President, and the Council is now in the process of incorporation.

The Council remains in sound financial health principally because expenditures on a number of 1985 items have been deferred. In order to remain financially solvent the Council will need to continue to carefully monitor expenses.

### ***Commentary***

The varied interest, concerns and activities of the Canadian geoscience community are a constant source of amazement. No one need be bored by lack of diversity within the CGC, where activities range from the work of the multimillion dollar drill ship of the ODP to concerns about restrictions on teaching evolution in Canadian high schools. It is interesting that these two activities are related, for evolutionary changes in marine life through time are the basis of sedimentary correlation.

Council must take care to be responsible. It loses credibility if it merely supports one and all causes relating to geoscience. I believe the varied interests that meet around the Council table have shown a substantial measure of maturity.

Within Canadian geoscience there are great opportunities for the innovative mind. The mineral resource industry is staggering under the impact of world-wide oversupply, while at the same time we become increasingly vulnerable to the scarcity of strategic minerals. In the energy field the economic requirement for detailed geologic knowledge of petroleum reservoirs and coal deposits is becoming increasingly apparent. Geotechnical work is really in its infancy and in a country that is largely glaciated, the skills of the Quaternary geologist are essential.

When a person obtains a knowledge of geology his or her view of the world is forever changed. The less worldly pronouncements of the political activist become proportionately less persuasive, but none the less still dangerous to the ill informed. We have an international opportunity to talk to fellow earth scientists around the world in order to seek the maximum benefit from our natural resources for all.

Of greatest scarcity is the time and energy to produce knowledgeable insight to do the things we should. If we all contribute a small amount, it will be surprising what we can achieve.

### ***Acknowledgments***

During the year the assistance of the outgoing Executive Director, J. Greenhouse, and the incoming Executive Director, B. Chatterton, have been particularly appreciated. C. Smith has continually provided excellent counsel, as have remaining members of the executive and council. M. Keen has been of particular assistance with matters concerning the Ocean Drilling Program, as have been many other members of the Department of Energy, Mines and Resources.

Thank you all for an interesting year. I have enjoyed your company.

*D.W. Organ*

## REPORT OF THE EXECUTIVE DIRECTOR

The office of the Canadian Geoscience Council was moved from the University of Waterloo to the University of Alberta in March, 1985, when Brian Chatterton replaced John Greenhouse as Executive Director. In the changeover the responsibility for editing the Annual Report was given to the Treasurer while the Executive Director assumed the duties associated with organizing meetings of Council.

During the year about 1000 copies of the Careers in Geoscience booklet were sold and distributed, primarily to university departments of geology and high schools across Canada, but also to EMR and the Petroleum Resource Communication Foundation, Calgary. Several copies of Future Directions of Mineral Deposits Research in Canada were sold. Approximately 250 copies of the 1983 and 250 copies of the 1984 Annual Reports of CGC were received from EMR (GSC papers 84-6 and 85-6), and most of these were distributed to organizations across Canada. Twenty thousand copies of a flyer, describing the CGC, were printed and over 15 600 were sent to the member societies for distribution to their membership.

Early in 1985, Council was informed that the Canadian Society of Soil Science had decided to relinquish membership in CGC. This brings the number of Member Societies to twelve.

During the year, a number of topics of concern to Canadian earth scientists were discussed. Probably the most controversial topic was accreditation. John Maher acted for CGC as a one-man Canadian Geological Accreditation Committee, and demonstrated an admirable ability to remain cool under fire. There appears to be some confusion in the minds of many Canadian earth scientists between registration and accreditation. Consideration was given by Council to accreditation of degree programs at Canadian universities on a national basis in order to create a generally acceptable set of standards for registration of professional earth scientists by the provinces. Opposition to this came from the Council of Chairmen of Canadian Earth Science Departments, the Council of University Geology Departments of Ontario, and the Canadian Quaternary Association, among others. By the end of the year this divisive issue was not resolved and the CGC decided to create a larger committee, with John Maher as chairman. This committee is to approach provincial governments and inform them of CGC's concerns that legislation on registration of earth scientists in Canada should be uniform across the country, and that these laws should protect the interests of both the public and individual earth scientists who must be registered.



PLATE 1

The Executive of the Canadian Geoscience Council, 1985.

Standing, left to right: D. VanDine, Treasurer; N. Allman, Executive Member; B. Chatterton, Executive Director; B. Norford, Foreign Secretary. Seated, left to right: C. Smith, Past-President; D. Organ, President; A. Laurin, Vice-President.

Council discussed publishing a new edition of the Careers in Geoscience booklet. Revisions, begun in 1982 suffered from problems of communication between members of Council and the editor of the booklet, Paul Copper. There were problems in respect to special interest groups who felt that their disciplines were not adequately represented in the revised draft. Council is strongly in favour of printing a new edition of the booklet but does not wish to approve the expenditure until members have a chance to approve the final draft. During 1985, the CGC office continued to sell the old booklet but at half price. The booklets were stamped with the statement: "This booklet was published several years ago. Some of it is dated. Demand for geoscientists varies, with periods of great demand alternating with periods of few jobs".

Another area of concern to Council was funding of major projects in the earth sciences by NSERC. Because of poor funding from government, NSERC was unable or unwilling to provide funding for Lithoprobe and the Ocean Drilling Program. Also, NSERC was unwilling to commit itself to any future special funding of this sort until it had received information on whether or not the Federal Government would fund its new 5-year program. Council supported lobbying for this new 5-year program through the National Consortium of Scientific and Educational Societies, with Peter Johnson as Council representative, and by writing letters to federal ministers.

During the year, Council wrote to all of the provincial ministers of education in support of the teaching of Biological Evolution in the school systems, as part of the science curriculum, noting that "Scientific Creationism" is an article of fundamentalist Christian faith and not science.

Council was active in putting pressure on the Department of Fisheries and Oceans (DFO) to rescind a decision to charge university researchers for ship time. DFO dropped this proposal, which would have raised \$2 000 000, perhaps partly because university researchers do not have access to sufficient funds to pay the charges had they been levied.

A list of topics discussed in Council meetings during 1985 follows (the numbers of the meetings in which the items were discussed are in brackets): Annual Report for 1985 (54, 55); Appointment of Nominating Committee (53); Audit of CGC Accounts for 1984/1985 (55); Availability of Ships for Oceanographic Research (54, 55); Canadian Geological Accreditation (52-55); Careers in Geoscience Booklet (52-55); Canadian Geoscience Council Flyer (54, 55); Incorporation (52-55); Exploration '87 (52, 55); Funding for 1985-1986 (54, 55); Future Directions of CGC (52, 53); Geoscience R. & D. in the Petroleum Industry (52-55); Geoscience Research in Exploration for Mineral Deposits (52-55); Geoscience Student Statistics (52); Lithoprobe (52-55); Membership of Council (53); Mines Ministers Conference (53); Nominating Committee for Executive of CGC (54, 55); Nomination of Auditors (54); Nominations for NSERC Committees (54); President's Report (55); Role of CGC in Educating the Media (54); Ship Time Charges to Universities (52, 53, 55); Status of Biological Evolution in Teaching (52, 53); Summer Works Programs (52); Survey of R. & D. Successes in Canadian Universities (53). **Reports of CGC Representatives:** Association for the Advancement of Science in Canada (52, 55); Consortium of National Scientific and Educational Societies (52, 55); NRC Committee on International Scientific and Technological Affiliations (52, 55); Technical Advisory Committee to AECL (54, 55). **Reports of Standing Committees:** EdGEO (52, 53, 55); International Geoscientific Relations (52-55); Marine Geoscience and Ocean Drilling Program (52, 53, 55); Quaternary Geoscience in Canada (52, 55). **Reports of Advisory Committees:** To the Earth Physics Branch (52-55); To the Frontier Geoscience Program (52, 53, 54); To the GSC on Mineral Research (52, 53); To the GSC on Quaternary and Engineering Geology (52-55); To the Ontario Geological Survey (52, 53).

*B.D.E. Chatterton*

# REPORT OF THE SECRETARY TREASURER

Table 2

## CANADIAN GEOSCIENCE COUNCIL APPROVED BUDGET, 1984-85

<u>EXPENSES</u>	<u>APPROVED</u>
Mineral Research Committee	\$ 6 000.00
Petroleum Research Committee	45 000.00
Quaternary Studies Committee	10 000.00
Marine Geoscience Committee	1 650.00
CNC/IUGS	3 000.00
Office Relocation	2 000.00
Incorporation	1 500.00
EdGEO Workshops	10 500.00
Secretarial Services, Postage	6 500.00
Stationery, Office Supplies	5 000.00
Printing: New Booklets	15 000.00
Distribution: New Booklets	5 000.00
Executive Travel	1 800.00
Council Meetings	2 400.00
Youth Science Foundation	150.00
AGID and AASC Memberships	200.00
Miscellaneous	300.00
<b>TOTAL</b>	<b>\$116 000.00</b>
 <u>INCOME</u>	
GSC: IGC Grant	3 000.00
GSC: CNC/IUGS Grant	3 000.00
GSC: Operating Grant	11 000.00
Provincial Grants	4 000.00
Membership Dues	5 800.00
Bank Interest	6 500.00
Ont. Gov't Contract 1805	4 000.00
Publication Sales	20 000.00
EMR Petroleum Research Grant	7 500.00
CPA Petroleum Research Grant	22 500.00
Quaternary Studies Grants	2 000.00
EdGEO Donations	5 000.00
<b>TOTAL</b>	<b>\$ 94 300.00</b>
<b>PROFIT (Loss)</b>	<b>( \$ 21 700.00 )</b>

W.G. MacLeod  
Secretary Treasurer  
November 28, 1984

Table 3

CANADIAN GEOSCIENCE COUNCIL  
STATEMENT OF INCOME AND EXPENSES<sup>1</sup>  
FISCAL YEAR 1984-1985, ENDING 30 SEPTEMBER 1985

<u>INCOME</u>	<u>84-85</u>	<u>83-84</u>
EMR: IGC Grant	\$ 3 000.00	\$ 3 000.00
EMR: CNC/IUGS Grant	3 000.00	3 000.00
EMR: Operating Grant	17 000.00	5 000.00
Provincial Grants	7 000.00	4 000.00
Membership Fees	1 708.13	5 768.00
Interest	7 560.21	5 940.68
Publication Sales	1 192.50	3 952.90
Mineral resources grant	-	8 000.00
EMR Petroleum Research Grant	-	15 000.00
CPA Petroleum Research Grant	22 500.00	-
Ont. Gov't Contract 1805	3 000.00	2 000.00
 ACCOUNTS RECEIVABLE		
Membership Fees	3 107.62	-
Miscellaneous	-	673.00
TOTAL INCOME	<u>\$69 068.46</u>	<u>\$56 334.58</u>
 <u>EXPENSES</u>		
Mineral Research Committee	-	\$ 2 818.28
Petroleum Research Committee	\$37 035.24	-
Quaternary Studies Committee	1 650.70	3 465.85
Marine Geoscience Committee	-	1 440.70
CNC/IUGS	-	3 000.00
Int. Geological Congress	-	12 000.00
EdGEO Workshops	4 600.00	8 116.05
Secretarial Services	2 258.00	-
Postage, Stationery, Office Supplies	3 258.83	10 734.74
Council Meetings	1 117.80	2 351.88
Executive Travel	2 296.18	1 573.42
Incorporation	500.00	-
Youth Science Fair	-	500.00
Youth Science Foundation	150.00	150.00
AGID and AASC Memberships	103.12	200.00
Miscellaneous	84.22	135.92
 ACCOUNTS PAYABLE		
Petroleum Research Committee	\$ 7 085.35	-
Quaternary Studies Committee	55.60	-
CNC/IUGS	3 000.00	-
Int. Geological Congress	3 000.00	-
Postage, Stationery, Office Supplies	246.43	-
Council Meetings	210.25	-
AGID and AASC Memberships	100.00	-
TOTAL EXPENSES	<u>\$66 751.72</u>	<u>\$46 486.84</u>
 <u>EXCESS OF INCOME OVER EXPENDITURES</u>	<u>\$ 2 316.74</u>	<u>\$ 9 847.74</u>

<sup>1</sup>Foreign Secretary's Accounts reported separately

Table 4

CANADIAN GEOSCIENCE COUNCIL  
BALANCE SHEET  
FISCAL YEAR 1984-1985, ENDING 30 SEPTEMBER 1985

<u>ASSETS</u>	84-85		83-84
Victoria		Calgary	
Chequing Account	\$ 2 437.58	Chequing Account	\$ 457.12
Savings Account	14 364.34	Savings Account	10 450.44
Term Deposits	84 396.41	Term Deposits	76 257.06
University of Alberta		University of Waterloo	
Operating Account	2 533.29	Operating Account	(1 459.66)
		Publishing Account	4 446.91
Total Accounts	<u>\$103 731.62</u>		<u>\$90 151.87</u>
Accounts Receivable	3 107.62		673.00
(listed with income and expenses)			
TOTAL ASSETS	<u>\$106 839.24</u>		<u>\$90 824.87</u>
 <u>LIABILITIES</u>			
Accounts Payable	13 697.63		-
(listed with income and expenses)			
TOTAL LIABILITIES	<u>\$13 697.63</u>		<u>-</u>
 <u>ACCUMULATED SURPLUS</u>			
	\$93 141.61		\$90 824.87

8 November 1985

TO: MEMBERS OF THE CANADIAN GEOSCIENCE COUNCIL

RE: Examination of 1984-1985 fiscal year end statement of the Canadian Geoscience Council.

We have examined the financial records of the Council (Treasurer's ledger, cancelled cheques, bank statements, etc.) for the year ending 30 September 1985.

All records are in order and we believe the financial standing of the Canadian Geoscience Council to be correctly represented on the accompanying Statement, Balance and Accumulated Surplus or Deficit Sheets dated 23 October 1985.

This report is not to be considered an audit but rather an examination directed by the Council of its records by the undersigned.

H.W. Nasmith, P. Eng.  
Member CGS, GAC, CANQUA

G. McArthur  
Member GAC, CIMM

Table 5

CANADIAN GEOSCIENCE COUNCIL  
STATEMENT OF ACCUMULATED SURPLUS,  
FISCAL YEAR 1984-1985, ENDING 30 SEPTEMBER 1985

Surplus at beginning of year (1 October 1984)	\$90 824.87
Excess of income over expenditures	<u>2 316.74</u>
Surplus at end of year (30 September 1985)	\$93 141.61

D.F. VanDine  
Treasurer, Canadian Geoscience Council

23 October 1985

Table 6

CANADIAN GEOSCIENCE COUNCIL  
FOREIGN SECRETARY'S ACCOUNT  
FISCAL YEAR 1984-1985, ENDING 30 SEPTEMBER 1985

CNC/IUGS ACCOUNT - STATEMENT OF  
ACCUMULATED SURPLUS

Surplus at beginning of year (1 October 1984) – Ottawa	\$5 234.63
Excess of income over expenditures	<u>(1 492.84)</u>
Surplus at end of year (30 September 1985) – Calgary	\$3 741.79

INTERNATIONAL GEOLOGICAL CONGRESS ACCOUNT

This account will be set up by the Foreign Secretary for Fiscal Year 1985-1986. In previous years it has been reported with the general Canadian Geoscience Council accounts.

D.F. VanDine  
Treasurer, Canadian Geoscience Council

23 October 1985

## REPORT OF THE FOREIGN SECRETARY

The Foreign Secretary acts as a link between the Canadian Geoscience Council and international non-governmental organizations with geoscientific activities that involve Canada. This liaison is achieved through the Standing Committee on International Geoscientific Relations (SCI GR) and the Canadian National Committee for the International Union of Geological Sciences (CNC/IUGS), both chaired by the Foreign Secretary. The SCI GR held its annual meeting in Ottawa, on November 29th, 1985, and this was followed on the same day by the annual meeting of the CNC/IUGS. Minutes of both meetings are available from the Foreign Secretary or the CGC Executive Director. The reports which follow are based on these minutes and incorporate some subsequent developments.

### ***Standing Committee on International Geoscientific Relations***

The Standing Committee is an advisory body on international geoscientific activities distinct from those of the IUGS and the International Geological Congress (IGC). SCI GR acts as a reporting forum to the CGC from Canadian organizations involved in such activities, and recommends to the CGC responses to international initiatives.

The 1985 meeting was attended by 12 representatives from most of the relevant earth science associations. Others sent written submissions. A.J. Naldrett commented on aspects of the legal liability of a society or of individuals involved in the organization and operation of scientific conferences and field trips. He noted that insurance could be arranged against potential claims and that formal incorporation of an organization set up partly or wholly for the purpose of conducting conferences and/or field excursions was possible.

### ***Association of Exploration Geochemists*** (R.G. Garrett)

Ian Thomson is the current President of AEG and Canadians also serve as Secretary, Treasurer, one of the Vice-Presidents and several of the Councillors. 371 delegates from 19 countries attended the eleventh International Geochemical Exploration Symposium in Toronto in 1985. A workshop on Geochemical Exploration in Tropical Rainforests was sponsored in Brazil jointly with AGID and IUGS. A joint project with IAGC was started, titled "Mineral Deposits Primary Geochemical Signature Catalogue" and is expected to aid the search for buried mineral deposits. A multilingual thesaurus is being planned, subject to financial support, to provide precise translations of technical terms used in exploration geochemistry. I. Nichol (Queen's University) will give a distinguished lecture tour in 1986 for AEG.

### ***Association of Geoscientists for International Development*** (A.R. Berger)

Continuing financial support is a source of concern but in 1985 the Canadian International Development Agency provided \$50 000 as a contribution to AGID's program. AGID News is edited by Jim McDivott, a Canadian based in Indonesia.

### ***Decade of North American Geology*** (J.O. Wheeler)

Canada is responsible for six of the regional North American volumes and for three national topic volumes. GSC is the coordinator but almost half of the more than 230 contributing authors are from other organizations. Together, these nine volumes will form the Survey's "Geology of Canada" that will comprise some 3600 pages of text, diagrams and photographs accompanied by thematic maps.

Compilation of the Atlantic Margin and Quaternary volumes should be completed by mid-1986.

### ***International Association of Engineering Geology*** (G. Ballivy)

A Canadian, Owen White, has been nominated for the next chairman. Symposia are scheduled in Argentina (1986), Italy (1986) and the People's Republic of China (1987). A Canadian thrust that is being developed concerns the transfer of technology in engineering geology between developed countries and developing countries; ten relevant programs are underway at Canadian universities and an international symposium is under consideration. Urban development in developing countries is a potential topic.

### ***International Association on the Genesis of Ore Deposits*** (G.B. Leech)

A Canadian, G.B. Leech, is Associate Secretary-General. Major international symposia are held at four year intervals, between International Geological Congresses. 1986's symposium will take place in Sweden; 1990's will be in Canada and include field excursions to remote areas. These will require significant financial support. In 1985, a workshop (held in United States) dealt with parameters that control the distribution of large ore deposits, clusters of ore deposits, mineral belts and metallogenic provinces.



### ***International Association of Hydrogeologists* (A.P. Kohut)**

The International Association of Hydrogeologists currently has 1531 members in 66 countries, 187 are Canadians. There is a very significant interface with engineering geologists. In 1985, the Canadian chapter cosponsored with AECL a symposium and workshop on brines and gases in crystalline rocks. Scheduled in 1986 is a conference (Saskatoon) with sessions on groundwater and soil salinity, and groundwater and geotechnical engineering. In 1988, an international meeting is planned in Halifax with themes that include hydrogeology of mineral deposits, groundwater in cold climate, and groundwater in coastal regions.

### ***International Federation of Palynological Societies* (D.C. McGregor)**

D.C. McGregor President, D.M. Jarzen Secretary-Treasurer, and J. Utting a member of council are all Canadians. IFPS has formal affiliations with both IUGS and International Union of Biological Sciences. The next International Palynological Conference is scheduled for 1988 (Australia). A world directory of palynologists is being compiled under the leadership of a Canadian R.A. Fensome, with publication scheduled for December, 1986. Two issues of the federations's newsletter *Palynos* were distributed in 1985.

### ***International Geographical Union and Canadian Association of Geographers* (P.G. Johnson)**

L.A. Kosinski was elected Secretary-General of IGU in 1984 and IGU's central office now operates from the University of Alberta. Three of IUG's fourteen commissions now are led by Canadians: Changing Rural Systems (M.J. Troughton); Urban Systems in Transition (L.S. Bourne); Significance of Periglacial Phenomena (H.M. French). The first of these commissions held a symposium at Guelph in July, 1985, consisting of four days of scientific program and a six-day field excursion. One of IGU's study groups (Development in Highlands and High Latitude Zones) also held a two-day meeting at Guelph and shared the field excursion.

Faculty members at Canadian universities are involved in international research and development in Egypt, France, India, Kenya, Mexico, Nigeria and Pakistan. Canadians are prominent in the activities of the various IGU bodies, of the International Commission on Snow and Ice, and of the International Glaciological Society (for which C.S.L. Ommanney edits the appropriately named newsletter, ICE).

### ***International Geological Correlation Programme* (A.J. Naldrett)**

IGCP receives its funding from UNESCO but the parent body is entering a period of severe financial constraints following the withdrawal of the USA and the United Kingdom from UNESCO with corresponding reduction of funds. However, IGCP is viewed as a strong and productive scientific project and there has been significant support for the maintenance of funding at recent levels. In 1985, 127 countries participated in IGCP projects, 81 through national committees and 36 by means of nominated individual scientists. IGCP itself is managed by its Board with the advice of its Scientific Committee. Since IGCP's inception in 1973, the program has changed emphasis as shown below:

	<u>1973</u>	<u>1984</u>
Precision of time scales	34%	12%
Events and processes	17%	29%
Resources	17%	16%
Methods	7%	12%
Regional Correlation	24%	31%

The current Scientific Committee and Board tend to favour projects that have more than a purely local interest, that address major issues or problems in earth science, that are primarily geological rather than primarily geophysical, and that include scientists from developing countries as well as those from developed countries. A.J. Naldrett participated as an observer in the IGCP board meeting in February. Consideration was being given to re-organization and perhaps amalgamation of the board and its scientific advisory committee. The decision was made to maintain the two bodies in February 1986.

Normally the Canadian National Committee for IGCP receives requests for funding of Canadian contributions to specific IGCP projects that total several multiples of the funds available. Canadians are participating actively in the following projects, coordinators are specified.

- 27 Caledonide Orogen (P.A. Schenk). A meeting in Norway was devoted to the preparation of a final report.
- 29 Precambrian-Cambrian Boundary (W.H. Fritz). A field conference was held in Newfoundland in preparation for a 1987 assessment of the suitability of the Burin Peninsula to serve as the International Stratotype.
- 156 Phosphorites (R.L. Christie). Neogene phosphorites of the southeastern United States were the subject of a field excursion and related symposium.
- 158 Paleohydrology of the Temperate Zone (M. Church). A symposium will take place in Ottawa as part of the 1987 INQUA meeting.

- 160 Precambrian exogenic processes (J.A. Donaldson). A two day symposium and field excursion were held in Ottawa, Cobalt and Sudbury.
- 161 Sulphide deposits in mafic and ultramafic rocks (A.J. Naldrett and W.W. Peredery). A symposium on platinum took place in Toronto with field trips to Sudbury and the Stillwater Complex, Montana. A field conference on nickel sulphides was held in Alaska. A layered igneous rocks symposium is planned for 1986 at the GAC-MAC annual meeting (Ottawa).
- 171 Circum-Pacific Jurassic (G.E.G. Westermann). Three Canadians participated in a field meeting and conference in Japan. Tentative plans for 1986 include publication of range charts of Jurassic microfossils and macrofossils and of an atlas of the Jurassic paleogeography of the circum-Pacific region together with description and illustration of the biostratigraphic zonations.
- 179 Stratigraphic methods as applied to the Proterozoic record (G.M. Young). In Canada, research involves standard stratigraphic and sedimentological techniques, with special emphasis on glaciogenic rocks. The use of major element geochemistry of sedimentary rocks has also been introduced as an interpretive tool in the study of Proterozoic successions.
- 187 Siliceous deposits (T.J. Barrett). The Canadian working group continued to concentrate on four main topics: cherts and jaspers associated with Precambrian iron-formations (with an August field workshop near Lake Superior); and cherts associated with Precambrian and Paleozoic massive sulphide deposits, with Paleozoic barite deposits and with shallow water carbonate-dolomite sequences.
- 197 Metallogeny of ophiolites (J. Malpas). There are three main areas of work: investigation of western Newfoundland chromite occurrences; Cyprus sulphide and chromite occurrences; Norwegian nickeliferous sulphides in the Karmony ophiolite.
- 199 Rare events in geology (D.J. McLaren). An international workshop was held in Switzerland. The participants agreed with the hypothesis that a Cretaceous-Tertiary event caused mass extinctions and was probably triggered by the impact of some astronomical body. A national meeting for Project 199 will be held during the GAC-MAC 1986 annual meeting.
- 200 Global Sea Levels (D.B. Scott). A special session on the State of the Art Methods in Sea-Level Determination in Canada was held at the 1985 GAC-MAC annual meeting. A full and perhaps final meeting of Project 200 will take place in Halifax in 1987.
- 203 Permo-Triassic Events of the Eastern Tethys Region and their Intercontinental Correlation (E.T. Tozer). Plans are underway for investigation of the Permo-Triassic boundary in the Himalayas and China, probably in 1987.
- 233 Terranes in the Circum-Atlantic Paleozoic orogens (J.D. Keppie). A meeting of the Canadian working group, to lay down the ground rules and establish its objectives, is scheduled to be held in Amherst, early in 1986 and later in the year an international meeting and field excursion will be held in Spain.

Seven new projects (including 233) were approved by IGCP in 1985 and catalysts are needed to provide leadership for Canadian contributions to three (the other three deal with eastern Asia, Africa and Gondwana).

- 216 Global biological events in earth history.
- 235 Metamorphism and geodynamics.
- 239 Exploitation of IGBADAT, the world base for igneous petrology.

#### ***International Lithosphere Program*** (M.J. Berry)

Revision took place in 1985 of the organizational structure of the Inter-Union Commission on the Lithosphere. In addition ICL decided on a major project of description and comparison of global transects to summarize geological and geophysical data along selected corridors that cross structures crucial to the understanding of the nature of the lithosphere and its history. Many of the transects extend from stable continental interiors to stable ocean basins, some are cross-sections through continental regions with significant tectonic histories. Some 200 transects are contemplated for appropriate understanding of global patterns.

ICL's transect project builds from the North American continent-ocean transect project with its 23 corridors. Publication of displays of these corridors is scheduled to commence by early 1986 with completion before 1988.

Many of the 1985 activities of the Canadian National Committee for the Dynamics and Evolution of the Lithosphere have concentrated on the support of lithoprobe projects. In the area of on-shore drilling for scientific purposes, a workshop will be held in February, 1986 (Ottawa) to assess the support for such a program in Canada and to identify its major thrusts.

#### ***International Mineralogical Association*** (D.G.W. Smith)

The next general meeting of IMA is scheduled for July, 1986 (USA) with 29 symposia together with plenary lectures and extensive field excursions. The newly formed Commission on Applied Mineralogy (acting-chairman, A.J. Naldrett) will be inaugurated at the meeting. In 1985, the World Directory of Mineralogists was published. 1985 was a very active year for the Commission on New Minerals and New Mineral Names (chairman, J.A. Mandarino) that considers and ratifies or rejects recommendations for the naming of newly discovered minerals.

***International Permafrost Association, International Society of Soil Mechanics and Foundation Engineering, International Tunnelling Association, and International Society for Rock Mechanics*** (G. Ballivy)

The Canadian National Committee for IPA, established by the Associate Committee on Geotechnical Research and endorsed by the CGC, was approved by the Committee on International Scientific and Technological Affiliations of the NRC Bureau of International Relations in November, 1985. An informal meeting of CNC/IPA was held in Ottawa and a formal meeting in Edmonton. The Fifth International Conference on Permafrost will take place in Trondheim, Norway in 1988.

ISRM is represented in Canada by the Canada Rock Mechanics Association (CARMA), formed in 1983 from the Rock Mechanics Division of the Canadian Geotechnical Society and the Rock Mechanics and Strata Control Committee of the Canadian Institute of Mining and Metallurgy. CARMA has a membership of about 400. J. Franklin and G. Herget represented Canada at the ISRM Council Meeting in Mexico in September. CARMA is organizing the Sixth International Congress on Rock Mechanics in Montreal in September, 1987.

ITA is represented by the Tunnelling Association in Canada, with about 250 members. Its 4th Annual Conference was held in Montreal in October. TAC initiated its annual technical publication "Canadian Tunnelling Canadian" in 1985.

ISSMFE is represented in Canada by the Canadian Geotechnical Society (CGS) with over 1200 members. Fourteen technical papers and one theme lecture were Canada's contribution to the 11th International Conference on Soil Mechanics and Foundation Engineering, San Francisco, August 1985. N.R. Morgenstern was appointed to the new executive of ISSMFE. The 12th International Conference will be held in Rio de Janeiro in 1989. ISSMFE's Technical Committee on Geotextiles is planning the next International Conference on Geotextiles, Montreal, 1990.

***International Union for Geodesy and Geophysics*** (M.J. Berry)

Approximately 3000 to 4000 delegates were expected to attend the 19th General Assembly in Vancouver, August 9th to 22nd, 1987. R.D. Russell is chairman of the Organizing Committee. Symposia are planned dealing with:

- Instability within the Earth and Core Dynamics
- Impact of Global Positioning System on Geophysics
- Variations in Earth Rotation
- Slow Deformation and Transmission of Stress in the Earth
- Large scale three-dimensional Earth Structure
- Lower Crust Properties and Processes
- Hydrogeological Regimes and Subsurface Thermal Effects
- Evolution of mid-oceanic ridges
- Comparative Planetology – Sputnik Commemoration
- Middle Atmosphere and its Latitude Dependence
- Displaced Terranes and Continental Accretion
- Results of the EMSLAB Project
- Dynamics and Monitoring of Pollution
- Contribution of Geophysical Sciences to Climate Change Studies
- Marginal Ice Zone Processes
- Low Latitude Ocean-Atmosphere Interactions
- Long Term Variations in Ocean Climate
- Origin and Evolution of Sedimentary Basins and their Energy and Mineral Resources
- Geochemistry and Geophysics of Transport in the Lithosphere-Asthenosphere System
- Future Directions for IUGG

***IUGS Commission for Comparative Planetology*** (R.A.F. Grieve)

Canada provided one of the eleven members of this Commission. The 16th Lunar and Planetary Conference was held in Texas and included a symposium on Venus and the evolution of its surface and its atmosphere. From Venera radar imagery, the northern hemisphere of Venus appears to include extensive volcanism and complex extensional and compressional tectonism. An Arizona Workshop on Global Megageomorphology was co-sponsored with NASA with the theme of applying planetary approach and experience to the terrestrial environment. The Commission notes increasing consideration of the Earth as a planetary body and with potential for application of methods of investigation developed for other planets. Using a data base within the Earth Physics Branch of EMR, CCP is preparing a global map showing the locations of impact craters on Earth and pertinent scientific details. During 1985, the Royal Society of Canada published "Nuclear Winter and Associated Effects" that includes use of planetary and impact analogies.

After participating in a Shuttle flight, M. Garneau indicated a deficiency in pre-flight training. Earth Physics Branch and Carleton University subsequently developed, for Canadian Mission Specialists, a short course on orbital planetary and earth science observations.

#### ***IUGS Commission for Experimental Petrology at High Pressures and Temperatures* (A.J. Naldrett)**

This commission is in the process of reassessing its role and scientific responsibilities, focusing on igneous and metamorphic petrogenesis, subject to ratification by IUGS. International symposia are planned for 1986 (granites, pegmatites and skarns; USA) and 1988 (volatile transport in magmatic systems and implications for ore scavenging, transport, and emplacement; Australia).

#### ***IUGS Commission for the Geological Map of the World* (J.O. Wheeler)**

Many submissions had been made at the 1984 International Geological Congress and 1985 essentially had been a year of assessing and synthesizing these submissions. North American activities are coordinated with those of the Decade of North American Geology. A new proposal has been suggested to produce a synthesis of the circum-Atlantic region.

#### ***IUGS Commission on Storage, Automatic Processing and Retrieval of Geological Data* (R.G. Garrett)**

A Canadian, R.G. Garrett is the Secretary-Treasurer. Three meetings took place in 1985; symposia on Mineral Resource Assessment and Prediction (USSR) and COGEODATA in Peru with concentration on basin analysis, remote sensing, geochemical hydrology and marine geology related to hydrocarbon resources and to geothermal resources; and a workshop in France on the application of microcomputers to mineral exploration. The existing three working groups of COGEODATA deal with spatial information technology, mineral exploration and resource assessment, and the provision of a world index of geological data sources. Consideration is being given to the formation of a new working group on water resources data, jointly with the International Association of Hydrologists.

#### ***International Union Quaternary Research* (A.V. Morgan)**

In 1987, the international meeting will take place in Ottawa with N.W. Rutter as chairperson and A.V. Morgan as Secretary-General. In 1985, an international symposium at Lethbridge was attended by 150 participants.

#### ***National Research Council Committee on International Scientific and Technological Affiliations and International Council of Scientific Unions* (R.A. Price)**

A major new activity under consideration by ICSU and IUGS is an international geosphere-biosphere program to study global changes, both natural and effected by human activities. The time is appropriate to expand knowledge of the physical, chemical and biological processes that govern the global behaviour of the terrestrial system. Such knowledge will improve the ability to forecast global changes. Two planning sessions (United States and Germany) were held during 1985 and a major planning session is scheduled in February, 1986 and will consider the needs for directed studies of geological processes, marine geoscience, forecasting geological hazards, hydrological research, water supply, mineral and energy resources, human impacts, and methods of monitoring change.

The Royal Society of Canada has appointed a group (including W.S. Fyfe and G.D. Garland) to consider Canadian participation in this program on global change. A workshop was held in early December 1985 in Ottawa on the topic.

#### ***Paleontological affairs* (T.E. Bolton and D. Russell)**

B.D.E. Chatterton is the representative for Canada to the International Palaeontological Union. The next North American Paleontological Conference is scheduled for August 1986 (Chairperson, T.E. Bolton) and will bring together the various and diverse disciplines of paleontology. A major advance during 1985 was the formal opening of the Tyrrell Museum of Paleontology in Drumheller with its research program focused on late Mesozoic vertebrates. A recent initiative is for joint studies of Alberta dinosaurs and those of the People's Republic of China, in part sponsored by the ExTerra Foundation with Canadian participation including scientists from the Tyrrell Museum and from the National Museum.

#### ***United Nations Educational, Scientific and Cultural Organization* (C.H. Smith)**

1985 was a difficult year for UNESCO and for its scientific programs. The withdrawal of both the USA and the United Kingdom caused severe financial retrenchment. The reduction in funding for geoscience programs was smaller than the overall level but it translates into almost 20% less money for 1986 and 1987. During 1985, CGC recommended draft resolutions to the Canadian Commission for UNESCO indicating strong support for the International Lithosphere Program and for the International Geological Correlation Program and urging some increase in their funding. The ILP budget is expected to be reduced but that of IGCP will be maintained and even slightly increased, because of widespread support and respect for the effectiveness of this program.

After considerable debate, Canada developed an official position of strong support for UNESCO combined with recognition of the continuing need for reform of its efficiency. In addition, the Canadian Government recognized the opportunity "... to increase cooperation between the Canadian International Development Agency and UNESCO, for instance in the case of small projects which cost nearly nothing and which can have a great developmental value by promoting education, science and culture". (Hon. Monique Vézina, Minister for External Relations, Hansard, 18-11-85).

Two documents were published in 1985 and describe in detail UNESCO's scientific programs and Canadian participation. "UNESCO: Why the S?" and "Canada and UNESCO – A Working Partnership" can be obtained from the Canadian Commission for UNESCO.

***Canadian National Committee for the International Union of Geological Sciences***

In April 1984, Dr. Berger, previous Chairman, initiated a review of the 1980 terms of reference and membership of CNC/IUGS (see GSC Paper 81-6, pt. 2, p. 8-9). The present Chairman submitted draft revisions to the November 29th meeting. These were discussed, dissected, resurrected and recommended to the Canadian Geoscience Council for action at CGC's March 1986 meeting.

In 1985 the Chairman wrote on behalf of the Committee to the Secretary-General of IUGS, expressing the Committee's concern on the manner of application of scientific procedures to the selection of the international stratotype for the Ordovician-Silurian Boundary in that the stratotype recommended to IUGS in 1985 did not satisfy many of the scientific characters identified as appropriate for stratotypes by ICS's Subcommission on Stratigraphic Correlation. Dr. Sinding-Larsen's reply commented that the ICS had accepted, by majority vote, the recommendations of the International Working Group on the Ordovician-Silurian Boundary and similarly the IUGS Executive had ratified, by majority vote, the decision of the ICS.

CNC-IUGS responded that it recognized that reasonable decision-making procedures had been followed within the Working Group, ICS and IUGS. However, the Committee considered that the International Boundary Stratotype selected at Dob's Linn may prove, with time, to be inadequate scientifically for the purpose. If so, then concern should be raised again with the ICS (especially within its Ordovician Subcommission and its Silurian Subcommission).

B.S. Norford  
Foreign Secretary

## REPORTS OF THE MEMBER SOCIETIES

### 1. Association of Exploration Geochemists

The Association of Exploration Geochemists is able to report a significant increase in membership and a healthy financial growth in 1985. At the beginning of 1985, the Association recorded a 63.6% increase in membership (based on January 1984 membership figures) largely due to an aggressive membership drive at the 1984 Reno, Nevada Regional Geochemical Meeting. Total membership in January 1985 was 1366 comprising 533 Voting Members, 649 Affiliate Members, 128 Student Members, 21 Corporate Members and 30 applicants under review. Membership continued to grow in 1985 and by October a further 23 Voting, 157 Affiliate and 28 Student Members had joined.

The principal meeting sponsored by the Association in 1985 was the 11th International Geochemical Exploration Symposium held in Toronto from April 27th to May 3rd. This Symposium attracted 371 participants from 19 countries and comprised four days of technical sessions, pre- and post-symposium field trips to gold deposits in northern Ontario and four pre-symposium workshops which focused on topics ranging from till geochemistry, geochemical anomaly recognition, biogeochemistry and rare earth geochemistry. The overall range of topics covered by the technical presentations was very broad and 51 research papers and 30 poster presentations were given on topics as diverse as rocks, soils, glacial deposits, stream sediments, and waters, vegetation and soil gases in environments varying from the permafrozen north to the tropics. Papers given at the Symposium will be published in the Journal of Geochemical Exploration during 1986.

Several of the other activities organized by the Association during 1985 focused on education. A series of lectures on exploration geochemistry were given at six North American Universities in the fall of 1985 and spring of 1986 by the Association's first Distinguished Lecturer, Dr. Ian Nichol of Queen's University, Kingston. Paul Matysek of Vancouver was awarded the Association's first Student Prize for his paper published in the Proceedings of the 9th International Geochemical Exploration Symposium. Also in 1985 the Association's first Scholarship in Exploration Geochemistry was awarded to Mark Wilson of the University of Saskatchewan. In 1986 the Association will sponsor and support regional exploration geochemical meetings in Vancouver, Canada; Athens, Greece; South Africa and Guilin, China. An important international development in 1985 was the formation of a Nordic Countries Association of Exploration Geochemists Sub Group under the Chairmanship of A.J. Bjorklund and the appointment of new Regional Councillors to Australia and Europe.

A highlight of 1985 was publication of the Exploration Bibliography Special Volume 11 Supplement Number One by the Association and distribution of the Supplement to the membership. It was compiled by H.E. Hawkes and contains 1785 citations relating to literature published in the field of exploration geochemistry between January 1981 and October 1984. The Association is also preparing a handbook designed to accompany a Short Course on Exploration Geochemistry jointly sponsored by the Association of Exploration Geochemistry and the Society of Economic Geologists. During the year an international committee was formed to develop a multilingual Lexicon of Exploration Geochemistry. Selected papers and abstracts from the 1984 Regional Geochemical Exploration Meeting held in Reno, Nevada, were published as an issue of the Journal of Geochemical Exploration in December 1985.

R.E. Lett

### 2. Canadian Association of Geographers

Scientists in the Canadian Association of Geographers have continued to be active nationally and internationally in a number of the domains which make up the discipline. At the international level there is strong representation in INQUA, IGU, IUGS and IUGG. Scientists are leaders or major participants in projects ranging from rural development in third world countries, to industrial and urban development strategies, to natural resource studies in cooperation with other governments and with the support of Canadian government agencies.

In the physical earth sciences major projects are in progress on glaciology and water resource problems in Pakistan, on water resource management in Mexico and India, on resource mapping in Nigeria, on pipeline-ground freezing problems in France and a multinational project on Quaternary environmental change in Africa. In Canada, the range of interests of the geographical community was again represented in the presentations at the annual conference at the University of Quebec at Trois Rivières and at the meetings of the regional divisions of the society. At the Trois Rivières annual meeting the society recognized the contributions to the discipline of Dr. L. Bourne, for scholarly distinction in geography and Dr. N. Nicholson (Posthumously) and Dr. W. Dean for service to the profession of geography. The Ontario Division held a meeting with the high school community (Ontario Association for Geographic and Environmental Education) at Brock University.

A totally new format for The Canadian Geographer appeared under the editorship of Dr. D. Janelle of the University of Western Ontario and The Operational Geographer continued to develop its objectives of communicating with geographers outside the universities. The review of the professional thrust of the association has been completed and submitted to the executive and new initiatives are under way in the services provided to the community at large. The 1986 annual meeting is scheduled for the University of Calgary in June.

### **3. Canadian Exploration Geophysical Society**

The Canadian Exploration Geophysical Society (KEGS) meets once a month at the Engineers' Club in Toronto. Members attend for discussions oriented to topics related to mining exploration. During 1985, topics presented included: the geophysics at Golden Pond; satellite gathered magnetic data; drillhole e.m. methods; tailing containment studies; the Earth Physics Branch; and transient e.m. for petroleum.

The KEGS breakfast, held during the Prospectors and Developers Meeting, is an annual test of stamina. At this breakfast meeting the Don Salt Awards were presented to two students from the University of Toronto, who have shown outstanding ability in geophysics.

*H. Limion*

### **4. Canadian Geophysical Union**

The CGU held a successful joint annual meeting with CSEG at the Calgary Convention Centre, May 7-10, 1985. CGU's scientific profile was high at the meeting, with sessions on Arctic Dynamics I&II, Lithoprobe I&II, Space Technology I&II, Paleomagnetism & Magnetism, General Geophysics, and a joint session on Electrical Geophysics. As well as the session on Space Technology - Geodynamics and Positioning, a pre-conference short course on GPS (the Global Positioning System) was offered and attracted a full attendance. CGU attendees also found much of interest in the CSEG sessions, which focused on state-of-the-art seismic data acquisition and processing and exploration case histories.

At the awards luncheon at the annual meeting, the J. Tuzo Wilson Medal was awarded to Dr. Harry O. Siegel in recognition of his leadership over many years in mineral exploration geophysics and geophysical instrumentation.

Since our affiliation with CIS (the Canadian Institute of Surveying), geodesists have become more active in CGU.

*D.J. Dunlop*

### **5. Canadian Geotechnical Society**

The Canadian Geotechnical Society has reached a record number of members at about 1100 of which 225 also belong to the Engineering Geology Division and 175 to the Rock Mechanics Division. New local sections have been formed in Victoria, and St. John's, with a revitalisation of the Regina Section. The Engineering Geology Division has formed a Task Force on Aggregates that has contacted interested members from across the country. The Rock Mechanics Division is fully involved in the preparation of the 6th International Congress on Rock Mechanics in Montreal, 1987. The 38th Canadian Geotechnical Conference was held in Edmonton, September 25-27. It was preceded by the 2nd Symposium on Geotextiles, September 23 and 24. This year has also seen the publishing of the 2nd edition of the Canadian Foundation Engineering Manual, a very popular document, produced by the members of the Society. The old Newsletter that evolved to become Geotechnical News has expanded its services to the United States and Mexico; it is now a North American Journal. The Society awarded the Legget Award to J. Adams; the best Canadian Geotechnical Journal paper award to N. Morgenstern and J-M. Konrad and the Thomas Roy Award (the best engineering geology paper) to T. Lord and A. Fair.

*J.E. Locat*

### **6. Canadian Institute of Mining and Metallurgy**

CIM represented on CGC by Geology Division, had a busy and productive year. Total membership stands at about 12 000. In contrast to many other organizations and societies where membership is declining, Geology Division experienced slight growth to slightly over 3000 members.

Highlights for the year consisted of:

The Annual General Meeting held in Vancouver, in April. The meeting included a major seminar on "Cordilleran Volcanogenic Massive Sulphide Deposits".

A symposium with field trips on "Granite-Related Mineral Deposits", held in Halifax in September.

A symposium with field trips on "Gold in the Western Shield", sponsored by the Saskatoon Section, Geology Division, held in Saskatoon in September.

The Barlow Memorial Medal for best paper published in the CIM Bulletin in 1984 was awarded at the 1985 Annual General Meeting to R.H. Wallis, N. Saracoglu, J.J. Brummer and J.P. Golightly for their paper "The Geology of the McLean Uranium Deposits, Northern Saskatchewan".

CIM continued to publish the CIM Bulletin, monthly; The Journal of Canadian Petroleum Technology, bi-monthly; The Canadian Metallurgical Quarterly, quarterly; the CIM Directory,

annually; CIM Reporter, four times. To date, a total of 32 special volumes have been published. The entire CIM publications program is being reexamined by an executive task force. Recommendations are currently being considered by Council.

A. Panteleyev

#### **7. Canadian Quaternary Association**

Since 1980, CANQUA has sought to maintain communication among 250 scientists in Canada, the United States, and Europe. CANQUA represents members in more than twenty disciplines including geology, geography, biology, ecology, paleontology, engineering, mining, climatology, meteorology, and pedology.

CANQUA sponsored an International Symposium at Lethbridge University in August, 1985. This four day conference was attended by 150 participants, and followed by a 4-day field trip. This successful conference, the 7th Symposium in eleven years, was organized by René W. Barendregt.

The problem of accrediting geoscientists in Alberta was discussed by the membership at the Lethbridge Meeting. The following declaration was passed (by acclamation).

"CANQUA, an interdisciplinary association of earth scientists affiliated with the Geological Association of Canada, is extremely concerned about the proposal to place further restrictions on professional accreditation for earth scientists, urges that demonstrated competence be the sole criterion and opposes the setting up of a national accreditation committee whose mandate will include definition of acceptable university curricula.

If individual university programmes are evaluated with a view to defining acceptability, CANQUA will insist that all disciplines which it represents be given the opportunity to propose alternate approved programmes for accreditation of Quaternary geoscientists."

CANQUA will award a new medal for professional excellence in the Quaternary sciences starting in 1986 or 1987. The membership will be asked to vote on a design for the medal and a name. This award will be determined by a committee of six members to be appointed by the executive.

The election of a new executive took place during the fall of 1985. Conrad Gravenor (U. of Windsor) was elected President, John Clague (Geological Survey of Canada) V.-President, and Michael Parent (U. of Sherbrooke) V.-President. Jacques Thibault remains as Secretary-Treasurer and William C. Mahaney is Past-President.

The Association's newsletter is now published twice a year.

W.C. Mahaney

#### **8. Canadian Society of Exploration Geophysicists**

CSEG has just completed a very active and productive year. Its major objective is to promote the science of geophysics and to promote fellowship among its members.

Highlights of 1985 include the following items. Our monthly news publication, The Recorder was upgraded to a magazine format and significantly improved communication. Our history book project, Traces Through Time, was completed and is selling well. Most importantly continuing education efforts were increased significantly and a most successful annual convention was held in May 1985 in conjunction with the Canadian Geophysical Union. Our luncheon technical meetings were given strong support with attendance varying from 600 to a record breaking 1000.

In addition, the Society, over the past few years, has placed emphasis on geophysical/government relations by providing input to government decisions that affect the livelihood of our industry.

To promote membership and fellowship several social sports functions were organized and were well attended. These included golf, tennis and squash tournaments, and a curling bonspiel. Our membership has significantly increased this year to approximately 2400.

L.C. Fichtner

#### **9. Canadian Society of Petroleum Geologists**

Membership increased by 3.9 per cent in 1985, to a total of 4077. Eighty per cent of the members live in Alberta and more than 75 per cent in the Calgary area. Financial and other incentives are now present to encourage more geologists to become members of the Society, and these, in conjunction with the increase in hiring of new graduates in the petroleum industry over the past two years, should produce a growth rate of at least two per cent per year to 1990. Currently at 61, the number of Corporate Members is only one above the lowest level in the past ten years. Continued, active promotion of this class of membership is clearly required.



Education is the priority function of the CSPG. A Special Advisory Committee on Education was established last year, under the chairmanship of P.A.T. Haines, to recommend educational strategies for CSPG for the next decade. The Committee will submit its final report in early 1986.

In 1981, the National Liaison Committee (NLC) was established to promote CSPG in Canada outside Calgary, and to provide a window on the rest of Canada for the Executive in Calgary. During the past year, the Executive has increasingly taken the NLC into its confidence, and, under the chairmanship of Graham Williams, the NLC has become more active and effective in its role as a national executive advisory committee.

The CSPG has been involved in joint projects with GAC for many years. Each society serves a different constituency and has strengths the other lacks. Discussions have begun about each sponsoring sessions on a regular basis at the other's Annual Conventions, in addition to holding occasional joint conventions, as we are planning for 1988. An opportunity for increased cooperation between the two societies was created this year with the election of Grant Mossop, who served briefly on the 1984 CSPG Executive, as Vice President (President Elect) of the GAC.

The international activities of CSPG are dealt with by several groups: the International Liaison Committee (ILC), the AAPG House of Delegates Committee, the International Division, and the Society's representative on the Canadian National Committee of the World Petroleum Congresses. The ILC has been active in promoting contacts in southeast Asia through numerous scientific meetings and workshops and, closer to home, has established, with the Technical Luncheon Committee, a successful speaker exchange program with the Rocky Mountain Association of Geologists.

Last year, on the suggestion of John Maher, the CGC established a committee to develop a national program for accrediting Canadian university geology programs. This would be a first step towards guaranteeing transferability of registration of geologists among provincial professional associations. Notwithstanding strong objections from universities, some progress was achieved. Our concerns have been made known and further representations will be forthcoming. Many CSPG members still have concerns about individual registration in APEGGA. The joint CSPG/CSEG/APEGGA Liaison Committee was established specifically to address problems in this perennially-contentious area.

The CSPG Annual Convention, which took place in Edmonton, in June 1985, was held jointly with the Petroleum Society of CIM. Three days of meetings, poster sessions, field trips and social events on the theme "Energy – Challenges and Opportunities" attracted over 800 professional registrants, including 600 (233 CSPG members) from Calgary. The technical content was excellent and, with the emphasis placed on heavy oil and enhanced recovery, very timely.

During 1985, the Society reached a milestone in publishing the Bulletin of Canadian Petroleum Geology – issues came out on time, in the designated month. More high-quality manuscripts are being received than ever before, manuscripts are longer, and many have been coming from outside Canada. The Reservoir, edited by Rory Hankel, appeared 11 times during 1985. CSPG's Geological Calendar was published again, but with a reduced print run, to match sales over the past two years. Apart from field trip guidebooks, continuing education course notes and the full-scale sepias of the Cross-Sections of the Western Canadian Sedimentary Basin, no significant publications came out in 1985.

The CSPG Technical Luncheons set a new record this year with an average attendance of over 900. The Continuing Education Committee under the chairmanship of Andrew Zolnai presented a program of four courses in 1985. Three successful one-day field trips were run during 1985. Geologists still remain field-oriented, and these trips are always popular with our members.

The Honorary Address, "Exploring the Mountains of the Sea", was presented by Robert D. Ballard, of Woods Hole Oceanographic Institute, to a spellbound audience of nearly 2000 at the Jubilee Auditorium. The lecture was illustrated by spectacular slides and a film of Ballard's undersea world, including shots of the sunken liner 'Titanic', which was discovered by Ballard only a few weeks before the presentation.

The eight Divisions of CSPG – Coal, Geochemistry, Geomathematics and Computer Applications, International, Paleontology, Petrology, Sedimentology and Structure – continued to provide opportunities for informal exchange of ideas on topics of interest, through lectures, panel discussions and field trips. The Geomathematics and Computer Applications Division sponsored Geotech '85 in September, 1985.

The Student Industry Field Trip was again a rousing success, under the chairmanship of Marjorie Sutherland. The two-week program provides a unique opportunity for 32 geology students from across Canada to learn about the petroleum industry, see some excellent geology, and make friends.

G.D. Williams

## **10. Canadian Well Logging Society**

The Canadian Well Logging Society has enjoyed another successful year. Increased activity in the petroleum industry, and enthusiasm of the membership, have contributed to the success of the society.

Vice-President, Orest Senkiw, arranged a wide variety of speakers and topics for our monthly luncheon meetings. The meetings were well attended by both members and non-members, and our arrangements with the Palliser Hotel generally worked well.

The Society realized a growth in membership again through 1985, thanks to the efforts of Membership Chairman, Don Zver, who replaced Jim Pryor near the beginning of the term. W.D.M. (Bill) Smith was elected Honorary Member of the Society. Bill served on past executives in various positions including that of President. He has also edited the society's technical journals, and contributed eight technical papers for publication. As well, he served on many symposium committees, and was co-chairman of the extremely successful joint CWLS/SPWLA international symposium in 1983. Bill's election, as the ninth Honorary Member, is in recognition of his contributions to the well-being of the Society.

Dave Orman, Publications Chairman, completed and published the journal, Volume 13, and has begun to work on Volume 14. The Log Analysis Handbook was published and distributed. Many thanks to the work of Bernie Cosett and his committee. The Rw catalogue is progressing under the chairmanship of Dave Orman and Case Struyk. This much used catalogue should be published in 1986.

Publication sales have done well this year, through the APEGGA office. Thanks to Sylvia Bertram and her staff.

The 10th Formation Evaluation Symposium, under the Co-Chairmanship of Ted Griffin Jr. and Dave Greenwood, was held September 29th through October 2nd, 1985 at the Calgary Convention Center. A total of 365 delegates were registered for the symposium, and thirty-four technical papers were presented. The Symposium was a technical, social, and financial success.

The winner of last year's President's Award for best paper on formation evaluation was Harry Smith of Welex, for his paper "Applications of TMO\* Pulsed Neutron Logs in Unusual Downhole Environments".

The Society thanks Lorne Slusarchuk, who served as our representative on the Canadian Geoscience Council.

A. Lye

## **11. Geological Association of Canada**

1985 saw a major leap in the publications program of the GAC, and the membership at year's end stood at 3027, breaking the three thousand mark for the first time. In May, J. Alan Coope replaced D.A. St-Onge as GAC President, G.D. Mossop became Vice-President, with J.G. Malpas continuing as Secretary-Treasurer.

The 1985 Annual Meeting with the MAC was held in Fredericton, N.B. with 833 registrants. The Logan Medal was presented to Raymond Price, Director General of the Geological Survey of Canada for his outstanding services to Canadian earth sciences as teacher, researcher, administrator, editor and foreign ambassador. The Past Presidents' Medal went to Derek York, University of Toronto, for his major contributions to geochronology and thermochronometry using innovative Ar 39 and 40 techniques. The Duncan R. Derry Medal was awarded by the Mineral Deposits Division (MDD) to Michael Knuckey of Falconbridge Copper for his very successful discovery record and his support for research and exploration projects. A national tour was made by the MDD's H.S. Robinson Guest Lecturer, J.G. Thurlow. The J. Tuzo Wilson medal of the Canadian Geophysical Union, a division of GAC, went to Harold O. Siegel in recognition of his outstanding contribution to the Canadian geophysical industry.

During 1985, the GAC published Special Papers 27 Jurassic Cretaceous Biochronology and Biogeography of North America – G.E.G. Westerman, 28 Evolution of Archean Supracrustal Sequences – L.D. Ayres et al., and 29 The Carswell Structure Uranium Deposits – R. Lainé et al. Also published were the second in the Geoscience Canada Reprint Series Dating Methods of Pleistocene Deposits and Their Problems – N.W. Rutter and a revised and expanded second edition of Short Course Notes Volume 3 Coal Petrology – R.M. Bustin et al. The Mineral Deposits Division issued its first two guidebooks in 1985: one to the Hemlo-Manitouwadge-Winston Lake Area (Ontario) and the other to the Highland Valley Camp, B.C. The Cordilleran Division of the GAC released two publications in its Short Course series: Geochronology and Isotope Geology for the Geologist and Explorationist – R. Parrish and J.C. Roddick, and Precambrian Lode Gold Deposits – C.J. Hodgson. As part of its contribution to the 1985 Meeting of the Cordilleran Section, the Division also released a collection of Field Guides to Geology and Mineral Deposits in the Southern Canadian Cordillera – D.J. Tempelman-Kluit.

During 1985, local GAC representatives were appointed at many universities and provincial mines departments across Canada, and much effort was spent in building up the membership, strengthening links with divisions, sections and affiliations and with other geoscience societies.

A.R. Berger

## **12. Mineralogical Association of Canada**

1985 was an active year. The 30th Annual meeting of MAC was held at the University of New Brunswick, Fredericton, in conjunction with the annual meeting of GAC. Held prior to the meeting was the 11th MAC short-course Applications of Electron Microscopy in the Earth Sciences, organized by Joe White of the University of New Brunswick. There was a considerable increase in the number of contributed papers this year, with 2 general sessions in mineralogy, 2 general sessions in igneous petrology, 1 general session in metamorphic petrology, 6 general sessions in economic geology and 1 general session in geochemistry. In addition, there were many excellent symposia and special sessions. All three symposia "Turbidite-Hosted Gold Deposits", "Brines and Gases in Crystalline Rocks" and "Diagenesis – a Geochemical Approach" were very successful and attracted large audiences. Of the many special sessions "Rocks, Minerals and Materials Science", "Image Analysis in Geology", "Lamprophyres, Lamproites,...", "Applied Mineralogy in Science and Technology" and "Crystallography and Crystal Chemistry: the R.B. Ferguson Symposium" were within the realm of MAC interests and were very well-attended.

The Annual Luncheon is the occasion when MAC confers its two major awards. This year, the Past-Presidents Medal was awarded to Denis M. Shaw, the eminent geochemist from McMaster University. Denis is well-known internationally for his fundamental contributions to many aspects of trace element geochemistry. He is currently editor of a rival journal, *Geochemica Cosmochimica Acta*, but makes amends for that by being a past-president and founder-member of MAC. The Hawley Medal for the best paper published in the *Canadian Mineralogist* during 1984 was awarded to Bob Dymek and Peter Gromet, of Washington University, St. Louis, and Brown University, Providence, respectively, for their paper "Nature and Origin of Orthopyroxene megacrysts from the St-Urbain Anorthosite Massif, Quebec".

The Canadian Mineralogist is the Association's quarterly journal, and the Association was pleased to find out that according to the Science Citation Index, "Can. Min." has the highest "Impact Factor" of all science journals published in Canada.

*F.C. Hawthorne*

## REPORTS OF THE ASSOCIATE MEMBERS

### **1. Associate Committee on Geotechnical Research (National Research Council)**

During 1985, the following activities were held:

- Workshop on the Illisarvik drained lake experiment of the Permafrost Subcommittee, Ottawa, 18 March 1985.
- Twenty-Eighth Meeting of the Permafrost Subcommittee, Ottawa, 19 March 1985.
- Meeting of the Working Group on Permafrost Glossary, Ottawa, 20-21 March 1985.
- Fourteenth Meeting of the Subcommittee on Urban Engineering Terrain Problems, Quebec City, 25 April 1985.
- Thirty-Fourth Meeting of the Peatlands Subcommittee, Ottawa, 28-29 May 1985.
- Second Meeting of the Subcommittee on Marine Geotechnical Engineering, Vancouver, 24-25 June 1985.
- Meeting of the Working Group on Cold Regions Engineering School of Snow and Ice Subcommittee, Edmonton, 4 July 1985.
- Fifth Meeting of the Subcommittee on Soil and Rock Engineering, Ottawa, 18 September 1985.
- Meeting of the Executive Committee of the Associate Committee on Geotechnical Research, Edmonton, 24 September 1985.
- Meeting of the Working Group on Permafrost Glossary, Edmonton, 17 November 1985.
- Meeting of the Editorial Committee of the Permafrost Testing Manual, Edmonton, 17 November 1985.
- Workshops on Subsea Permafrost and Pipelines in Permafrost, Edmonton, 18-19 November 1985.
- Twenty-Ninth Meeting of the Permafrost Subcommittee, Ottawa, 20 November 1985.
- Thirty-Fifth Meeting of the Peatlands Subcommittee, Ottawa, 21 November 1985.
- First Meeting of the National Task Force on Soil Barriers to Control Groundwater Contamination, of the Subcommittee on Soil and Rock Engineering, Ottawa, 10 December 1985.

*M. Bozozuk*

### **2. Committee of Provincial Geologists**

As in previous years, meetings of the Committee of Provincial Geologists were held in conjunction (1) with the Annual Meeting of the Prospectors and Developers Association in Toronto, Ontario (March 10); (2) with the meeting of the Provincial Mines Ministers, this year at Charlottetown, Prince Edward Island (September 16); and (3) in its interface with the Geological Survey of Canada at the National Geological Survey Committee in Fredericton, New Brunswick (May 14).

These meetings provide a forum wherein matters of mutual interest and benefit to the goals and operations of geological programs in the Provinces and Territories are explored. Such matters include organizational formats, budgets, program outputs, fiscal arrangements for federal-provincial co-operation on geological projects, and regulatory environments for mineral exploration. Formalized presentations of these topics are published in the Provincial Geologists Journal, 1985.

Other highlights of the Committee's work include: (1) the near complete coverage of the Provinces and Territories in the institution of local industry-government Mineral Advisory Committees. The intent is to render the planning and implementation of geological programs more amenable to industry needs; (2) a successful Committee-sponsored unified display by the Provinces and Territories of their geological programs and mineral resources at the Prospectors and Developers Annual Meeting; and (3) passing of a resolution inviting the Territorial Governments of the Yukon and Northwest Territories to provide observers to the meetings of the Committee.

*J.E. Christopher*

### **3. Council of Chairmen of Canadian Earth Science Departments**

CCCESD is growing more formal as problems become more complex. A constitution was formally adopted at the May 1985 meeting in Fredericton. At that meeting, the Executive was also directed to draft some terms of reference for an Advisory Committee to the Council, our principal intent being to obtain, from a set of distinguished people, outside opinions on some of the complex problems we face. These terms of reference have now been drafted and it is anticipated that they will be adopted at the next annual Meeting in May 1986.

One problem that could not wait for the development of an Advisory Committee was the proposal to move to full-scale accreditation of earth science programs in Canada, as illustrated by

the draft CGC document "Accreditation Work Manual". In a rare demonstration of cohesion at a special meeting held on November 22, 1985, the CCCESD voted unanimously to oppose any form of accreditation of departments or programs within a science faculty. There was very strong feeling that those who drafted the document did not have a clear understanding of the mission of universities nor of how they operate. The problems that will be faced range from those of a purely mechanical nature to those that are philosophically intractable. There are so many variables that a quantitative evaluation at any given time must be highly suspect.

The current consensus of CCCESD is that there might be a need to license some individuals who have some responsibility of a contractual nature where public safety (in the broadest sense of the word) is involved. It would, however, be foolish to press for massive, time-consuming and expensive procedures to license a whole profession. It is possible that a recent decision of the CGC (December, 1985) may in fact lead to the individual approach.

*A.E. Beck*

#### **4. Earth Physics Branch**

The Earth Physics Branch, EMR works to ensure the availability of geophysical information and expertise concerning the solid earth, its physical processes and geophysical hazards, as required for public safety and security and for management of the Canadian landmass and offshore areas.

These objectives are met through the development and maintenance of national data bases in the fields of seismology, geothermics, geomagnetism, gravity and geodynamics; the analysis and interpretation of these data, in order to develop new concepts and understanding of the geophysical framework of Canada, and of its current and historical dynamics; the assessment of earthquake and permafrost risks and hazards in Canada, including research on forecasting where applicable; and the application of expertise and knowledge to the solution of current national problems.

The Branch is organized into three Divisions: (1) Seismology and Geomagnetism; (2) Gravity, Geothermics and Geodynamics; and (3) Pacific Geoscience Centre. The 1985-86 budget of the Branch was \$17 million and 169 person-years. Highlights of 1985, grouped by topic, are described below.

##### Division of Seismology and Geomagnetism (Ottawa)

###### **SEISMOLOGY**

- The division continued the rapid determination of epicentres of Canadian earthquakes with results published in bimonthly and annual listings of earthquakes for Canada and adjacent areas.
- Studies of the seismically active Charlevoix region in Quebec are directed toward an improved understanding of the cause of the seismicity and detection of effects that are possible precursors to large earthquakes.
- Excellent progress was made in 1985 in the development of a single-channel digital seismograph featuring data storage in solid-state memory.
- A highly successful Vibroseis survey was completed across the southern Cordillera as part of the multidisciplinary Lithoprobe project.
- Also in Lithoprobe, a seismic refraction survey was completed across the Peace River Arch in Alberta in collaboration with seismologists from GSC and Canadian universities.
- Scientists from EPB and GSC continued major refraction and reflection surveys on the Canadian drifting ice island. The survey, part of the Frontier Geoscience Program, is aimed at mapping sedimentary basins under the polar continental shelf as an aid in the assessment of their hydrocarbon potential.
- In support of arms control and disarmament initiatives of the Department of External Affairs, the division continued research on the discrimination of underground nuclear explosions.

###### **GEOMAGNETISM**

- Automatic magnetic observatory systems (AMOS) were installed at Mould Bay and Alert, N.W.T., completing such deployments.
- Magnetotelluric data from Vancouver Island (part of the Lithoprobe project) were analyzed to reveal a conducting zone coincident with one of the major boundaries defined by the Vibroseis<sup>TM</sup> survey.
- Analysis continued of magnetotelluric surveys on Prince Edward Island and over the Fredericton Basin, New Brunswick, to establish the nature of major crustal structures. The surveys are components of the evaluation of geothermal energy in Atlantic Canada.
- The paleomagnetic group developed firm plans for participating in ODP.

## Division of Gravity, Geothermics and Geodynamics (Ottawa)

### GRAVITY

- A contracted survey for underwater gravity mapping of selected areas off the east coast of Canada was completed on schedule.
- The division finished a cooperative project with the Atlantic Geoscience Centre, GSC, to edit, process, adjust and store in the National Gravity Data Base the results of over two million gravity observations made off the east coast over the last twenty years.
- A production system for the computer generation of coloured gravity anomaly maps is in the last stages of refinement.
- Gravity mapping and sampling was successfully completed for the Sept-Îles intrusion and in parts of the Cape Smith fold belt.
- Staff members are contributing their expertise on impact structures to the current debate on the importance of impacts as a planetary process.

### GEO THERMICS

- A geothermal recording package deployed over an abandoned oil well was recovered from the sea ice south of Ellef Ringness Island in the Arctic. The recovery completed the demonstration of an offshore temperature-measuring system developed in cooperation with industry.
- Programs to monitor permafrost and ground conditions along the Norman Wells to Zama Lake pipeline and in Cominco's Polaris Mine, N.W.T. were continued.
- Meetings were held with the town of Springhill, N.S. to examine the feasibility of using heat pumps to extract energy for space heating from flooded coal mines.

### GEO DYNAMICS

- Doppler tracking of satellites and daily data transmissions to a U.S. data centre, and photographic zenith-tube observations, data reduction and weekly transmissions to the Bureau International de l'Heure and the International Polar Motion Service have continued. Output from these facilities continues to rate highly in terms of world standards.
- The installation of an upgraded Doppler satellite tracking system at both Shirley's Bay, Ontario, and Priddis, Alberta, marked the completion of many years' effort to produce an advanced, fully automated system.
- The division provided navigational support to the ice-island project using satellite-based techniques. Development of automated, near-realtime systems for this task continues.
- The Canadian part of the second year of NASA's world-wide Crustal Dynamics project using mobile radio telescopes was successfully completed despite hardware problems at Yellowknife.

### Pacific Geophysics Division (Sidney, B.C.)

- Analysis of repeated geodetic levelling from central Vancouver Island appears to indicate a rapid tilting possibly associated with an earthquake cycle. These results are receiving close attention.
- Cruises over the Juan de Fuca Ridge have focused on seafloor mapping and geophysical studies directed to ridge structure and to deep-sea sulphide deposits. Particularly significant was the recovery of a 3 m sulphide core from a sediment-hosted environment.
- Four contracted multichannel seismic lines shot across the Pacific continental margin are complementary to the Vancouver Island Vibroseis<sup>TM</sup> profiles, and show similar reflections from the underthrust oceanic crust.

In January 1986, the Deputy Minister of Energy, Mines and Resources Canada announced that the Earth Physics Branch is to be amalgamated with the Geological Survey of Canada "to reinforce scientific programs and achieve economics of scale". The core scientific activities of the Earth Physics Branch will be reconstituted as a division of the GSC. This terminates the eighty-year history of the Branch and its forerunner, the Dominion Observatory.

## **5. Geological Survey of Canada**

The work of the GSC can be described in terms of three interrelated activities which contribute to meeting the mandate of the Branch – ensuring the availability of comprehensive knowledge, expertise and technology concerning the geology of the Canadian landmass and offshore. These activities are:

- providing basic geoscience knowledge;
- providing information on the nature, distribution and magnitude of our mineral and energy resources and related exploration technologies needed to develop national policies and to support and stimulate exploration for new resources;

- providing the geoscience information needed for the effective use of the land including the identification and assessment of natural geological hazards, features and processes that affect the environmental and ecological balance and that may constrain our use of the landmass.

During 1985, the ability of the GSC to meet its responsibilities was considerably enhanced by the commencement of new programs noted in the 1984 CGC report. Most of these are five-year programs and activities will peak in 1986 and 1987. As brief descriptions of these programs are contained in the 1984 report only highlights of results for 1985 follow.

**Frontier Geoscience Program:** An aeromagnetic survey of northeast Grand Banks and Orphan Basin was carried out with five industry participants as equal partners. An assessment of existing Hudson Bay seismic data was undertaken as was an appraisal of industry-generated multichannel seismic and Labrador well data. About 650 km of deep multichannel seismic data were acquired across the Vancouver Island Margin and long range sidescan data were collected over the margin from the Strait of Juan de Fuca to the Queen Charlotte Islands. In the Arctic Islands mapping, section measurement and sample collecting were carried out and 300 km of refraction seismic lines were shot north of Axel Heiberg Island.

**Federal Provincial Mineral Development Agreements:** 77 projects were carried out in five provinces. Initial results took the form of 52 poster sessions at "open houses" and 22 reports to be published in GSC "Current Research Part A" (Paper 86-1A). In addition 14 projects were carried out in southern Quebec under two Federal Mineral Programs. Nine "Current Research" papers were published in GSC Paper 86-1A.

**Offshore Bilateral Boundaries:** In the St. Pierre-Miquelon area, multichannel seismic, aeromagnetic and hydrographic surveys were completed. In the Juan de Fuca area, work included the acquisition of 10 000 km of gravity, magnetic and bathymetric data. Various studies were also carried out in Beaufort Sea area. This program ends 31 March 1986.

**Ocean Drilling Program:** Canada became a full participant in this program early in the year. Leg 105 which involved drilling in Baffin Bay and Labrador Sea was completed in late October. A GSC officer was co-chief assistant.

**Lithoprobe:** A Vibroseis transect of the Purcell and eastern Selkirk mountains was completed but the planned Kapuskasing transect was postponed.

#### Some 1985 Achievements

During 1985 the GSC published about 6000 pages of scientific text in its own series including the following:

- 1 memoir
- 2 bulletins
- 27 papers (including two volumes of "Current Research" comprising 139 reports, 15 notes and 28 reports resulting from Federal/Provincial programs)
- 2 economic geology reports
- 3 miscellaneous reports
- 11 coloured geological maps
- 94 open file reports

In addition geophysical and geochemical data were released as maps including eight sheets in the coloured 1:1 million magnetic anomaly series which appear to be filling a user need.

Some results of the special programs have already been given. Some highlights of the on-going, core program follow:

- eight EMR and two university led cruises in the Juan de Fuca-Explorer Ridge areas off the West Coast extended basic knowledge through dredging, water column sampling, bottom photography, multichannel and refraction seismic surveys and other techniques. Potentially large sulphide occurrences were discovered;
- a variety of field investigations were undertaken to assess geological constraints and hazards to development. Drilling and shallow geophysical surveys were made of Fraser Delta in view of heavy urban and industrial development and other surveys were made of massive slides on the slopes of the continental margin off Vancouver Island; continuing acid rain studies involved examination of lake sediment profiles and till sampling in eastern Canada;
- evaluation of conventional Western Canada oil resources was carried out and planning and basin analysis co-ordination for similar evaluations for the Hibernia and Beaufort Sea areas was done;
- field studies were made in the Wager Bay-Southampton Island and Nahanni National Park reserve areas to assist in mineral resource potential assessments;
- a successful week-long joint GSC-USGS workshop on methods in mineral resource assessment was held in Leesburg, Virginia. Participants included those from federal, state and provincial surveys as well as U.S. and Canadian industry and universities;
- one of the most ambitious crustal seismic refraction surveys ever undertaken in Canada was completed in the Peace River Arch area. This constituted seismic recordings at 385 sites along

1300 km and involved GSC and EPB staff as well as staff from six Canadian universities. Data are being processed at the University of British Columbia;

- contracts totalling \$23.5 million were placed with industry for research and development and related scientific activities during the first 9 months of the fiscal year.

#### Organization

In 1985 the GSC comprised eight divisions with about 40 per cent of the staff in three regional divisions. The GSC in 1985 had a planned authorized strength of 826.5 person-years and a budget of \$80 million. These totals include the resources made available through short-term projects such as the Frontier Geoscience Program, Mineral Development Agreements, etc. The divisions, and their 1985 resources are as follows:

- Atlantic Geoscience Centre (Dartmouth, N.S.) – 118.5 person-years, budget of \$16.65 million
- Cordilleran Geology Division (Vancouver and Sidney, B.C.) – 49 person-years, budget of \$4.8 million
- Economic Geology and Mineralogy Division (Ottawa) – 38 person-years, budget of \$5.0 million
- Geological Information Division (Ottawa) – 95 person-years, budget of \$4.2 million
- Institute of Sedimentary and Petroleum Geology (Calgary) – 160.5 person-years, budget of \$14.8 million
- Precambrian Geology Division (Ottawa) – 73 person-years, budget of \$5.1 million
- Resource Geophysics and Geochemistry Division (Ottawa) – 98 person-years, budget of \$9.7 million
- Terrain Sciences Division (Ottawa) – 64 person-years, budget of \$4.2 million.

#### **6. Royal Society of Canada (Earth Science Division)**

Professor W.S. Fyfe was the Royal Society Miller Medallist in 1985. As medallist, he addressed Academy III of the Society on "Global Change: What Should Canada do?" on June 4th during the Society Annual Meeting.

Future plans for the Division include co-sponsorship, together with the Applied Science Division, of a symposium on the "Management of Toxic Wastes" at the Canadian Engineering Centennial Congress, to be held in Montreal in May 1987.

*A.J. Naldrett*



## REPORTS OF THE ADVISORY AND REVIEW COMMITTEES

### **1. Earth Physics Branch Advisory Committee**

The Committee completed its report in the spring of 1985, approximately one year after the project had been assigned. The report stressed the importance to Canada of the basic geophysical research and data acquisition carried out by EPB. It was generally complimentary of the present programme and accomplishments of the staff, but it recommended increased efforts to improve visibility, including a change in name to "Geophysical Observatory of Canada". In June, the chairman delivered copies of the report to Dr. W.W. Hutchison, Assistant Deputy Minister, Earth Sciences, Department of Energy, Mines and Resources. Dr. Hutchison subsequently wrote to express his appreciation to the Committee for their work, and to give his approval to the publication and wider distribution of the report.

The report was made available to members of CGC Council at the September meeting, and was discussed in December. The Council resolved to publish the report, incorporating the response of the Earth Physics Branch itself into the volume, as had been done in the case of previous reviews. At the meeting with officers of the Department of Energy, Mines and Resources, held on December 3, Dr. P.O. Perron, Associate Deputy Minister, explained that, because internal reorganization of the Department was about to take place, it would not be possible to publish the Branch's response. The Canadian Geoscience Council was free to publish the report at its own expense, but Drs. Perron and Hutchison urged a postponement of action, so that the format could be consistent with previous reviews.

(On January 15, 1986, the amalgamation of the Earth Physics Branch with the Geological Survey of Canada was announced.)

*G.D. Garland*

### **2. Advisory Committee to the Geological Survey of Canada on Mineral Deposits Research**

This Committee met in March and April 1984 and circulated questionnaires to industrial, government and academic geologists over the summer. The Committee then met with GSC personnel engaged in mineral deposits research in September 1984, at which time they compiled their questionnaires and wrote their report. This was submitted to the GSC in October 1984. A response was received in February 1985, whereupon a copy of the report, with appropriate corrections, was submitted to the CGC in late February. The report was debated at the March CGC meeting, and a final version was submitted a week thereafter. The report was submitted to the GSC's Publication Office in August 1985 and in due course, the report will be published, together with a response by the GSC.

*A.J. Naldrett*

### **3. Geoscience Research and Development in the Canadian Petroleum Industry – Review Committee**

Up until 1985, the extent of geoscience research and development in the Canadian petroleum industry is unknown. It was probed by a survey in 1985. Joint funding for the study was provided by the Canadian Geoscience Council and the Canadian Petroleum Association.

A detailed questionnaire was prepared to probe the extent of the research and development activities and to characterize it (objectives, how it is organized, how it is financed, services it relies on, etc.). Over 90 responses were received and provide a good representative cross-section of the role played by multi-national oil and gas companies, Canadian oil and gas companies, the service industry, universities and government institutions.

Information received provides new insight into research and development in this vital area. The report will be finalized in early 1986.

*D.W. Devenny*

### **4. Geoscience Research in Mineral Deposits – Review Committee**

Three surveys on mineral deposit research in universities, government, and industry have been completed. Response to the questionnaires might indicate the degree of concern each group has to mineral deposit research. A complete government response reflects their commitment and keen interest; the partial response from universities indicates their less-than-enthusiastic involvement; industry apparently found the questionnaire too onerous. Thus, there is a need to restructure the approach to industry to obtain a deeper data base. Very brief notes on selected responses are reported below, but no serious analysis of the collated data has been attempted.

The survey of earth science departments in Canadian universities received 21 replies from 51 questionnaires. Quality of the replies varied dramatically from comprehensive and thought provoking, to general and not conducive to analysis. Responses of this survey reveal that:

- about one third of the departments need additional space in the near future;

- short courses and programs for retraining industry are erratically given;
- economic geology and related subjects appear to be well represented in curricula;
- mineral deposits research is funded at a level proportionately below the average level of funding in earth science departments;
- principal constraints on future research are physical facilities and limitations of funds;
- recommended partitioning among disciplines for additional research funds is (median response): geology:geophysics:geochemistry:other = 40:20:30:10.

The survey of Canadian government agencies received an excellent response from all 13 major Provincial and Federal Agencies. This survey noted that:

- hinderances to scientific activities were related to lack of, and shifting priorities on funding;
- process of defining priorities for research was largely internal discussion;
- use of outside contracts varied widely depending on capabilities of departments and expertise;
- funding of scientific activities in universities and industry was supportive but inadequate;
- about 30% (median) of scientific programs were appropriately completed;
- 38% (median) were satisfied with the training available for persons specializing in exploration for minerals; 48% were ambivalent or unsatisfied;
- the major contribution to training was through the sponsorship of students, and research projects;
- 46% (median) felt there was adequate exchange between Canadian scientists engaged in mineral exploration research; 31% were uncertain or felt exchange was inadequate;
- fields of Canadian expertise in mineral exploration were primarily geological modeling, geophysical instrumentation, and consulting;
- 15% felt that dependency on foreign research was too high; 69% said no or maybe;
- improvement in exchange of ideas between federal and provincial is needed: 38% yes, 54% no or maybe;
- computer assisted information systems need to be improved;
- all respondents noted that research and development in mineral exploration was inadequate.

The survey of industry received only 38 responses. These probably are not truly representative, specifically, junior companies are under represented. The study asked and received responses to:

- the place of research in industry: commitment ranges from 0 to 8% of exploration funds (drilling excluded);
- relationship to government, universities and other companies involved in mineral exploration research: general support is normal but making funds available for outside research is rare;
- sources of new information and ideas: much from government (especially Provincial) publications and personal contacts; a variety of publications are examined (except for CIM, Canadian journals are not considered to be a source of research information); universities offer basic training and some short courses, but there is generally poor dialogue; open meetings are thought to be the most important exchange for ideas and information;
- Canadian mineral exploration research is too dependent on foreign research: 75% no, but cautioning and dissenting points of view;
- research and development in mineral exploration research is adequate: 76% no, but differing opinions; responses for increases indicate need for research in all areas, namely: geology 32%, geophysics 29%, geochemistry 27%, and other 12%.
- basic research is the responsibility of universities (54% yes), while applied research and scientific development are the responsibility of industry (57% yes);
- allocation of resources: (i) for basic research 45% to universities and 34% to government agencies, (ii) for applied research equal resources applied to all sectors, and (iii) for scientific development mainly (46%) by industry.

There is much information in the material collated. However, the study is being extended by obtaining follow-up responses from a selected spectrum of companies by questioning them in personal interviews with the aid of a concise questionnaire (interview time to be in the order of an hour), and by striking subcommittees to research specific information needed to flesh out the report.

C. Godwin

## **5. Quaternary Geoscience in Canada – Review Committee**

This committee was established by the CGC to examine the role and status of Quaternary geoscience in the country. The committee examined a preliminary draft of its final report during the

annual meeting of CANQUA in August at the University of Lethbridge. The committee identified omissions in the report, proposed ways of obtaining additional information, and discussed final recommendations.

A number of principal conclusions are now evident. It is apparent from an analysis of replies to a nationally-distributed questionnaire and from a survey of publications, that Quaternary research is being developed with skill and effectiveness to an international standard. Some allowance, however, has to be made for the characteristically Canadian problems associated with vast areas and a small population. The emphasis in research continues to be on Pleistocene and immediate postglacial events. Research in many parts of the world is expanding rapidly on the Holocene period and a similar trend is anticipated in Canada.

A major section of the report describes the nature of Quaternary geoscience. The report recognizes that Quaternary geoscience aims to reconstruct the physical elements of Quaternary environments, to identify the geoprocesses operating in them and to establish a chronological framework for Quaternary events. As such, multidisciplinary studies investigate the variation in environmental elements and processes in both spatial (geographical) and temporal dimensions. The report identifies core and ancillary fields of Quaternary studies and finds that several of the ancillary, but essential fields, most particularly glaciology and dynamic paleoclimatology, are weakly developed in the research and university training sectors.

Whilst the energy and calibre of individual scientists, supported with generally adequate although not overabundant funding, overcome many of the problems associated with interdisciplinary research, the committee is less satisfied with the adequacy of university training in Quaternary geoscience. There is conspicuous lack of cooperation in some universities between the traditional academic disciplines involved in Quaternary studies and the committee is continuing to examine this problem.

A long-term objective of Quaternary science is to predict future physical environments, and hence to provide a factual basis for society to anticipate environmental change from analysis of past environment, particularly during the Holocene. In addition to the continuing need for Quaternary geoscientists for basic research, national data collection and teaching, contemporary applications of Quaternary science as in Quaternary geochemistry (defined to include drift prospecting, industrial waste disposal etc.) and geotectonics are in wide use and are creating a demand for additional specialist Quaternary geoscientists. The report also recognizes that there is a broad range of professions including soil science and many aspects of planning (environmental, regional, urban, resource etc.) in which exposure to Quaternary science should be a prerequisite of all professional training.

It is planned to complete the final draft of the report in the first half of 1986.

*J.B. Bird*